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XXXIII.

THE SUBPERIOSTEAL ABSCESS OF THE MASTOID REGION.

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The subperiosteal abscess of the mastoid region is a fairly frequent disease. This is evident from the fact that during the last four years and a half, one hundred cases have been treated in the Ear Department of the Copenhagen Commune Hospital, out of about 2500 cases of acute and chronic middle ear suppuration which came under observation during the same period.

This disease may be a purely primary disease; in my 25 years' experience as an otologist I have, however, never observed such a case, and the above mentioned 100 cases were all secondary, the primary disease having been suppuration of the middle ear. The subperiosteal abscess is then an otogenic disease.

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Sex and Age.—In the 100 cases here to be dealt with the sex and age were as follows:

	Males.	Females.	Total.
Under 1 year	12	3	15
From 1 to 4	12	20	32
From 5 to 14	15	23	38
From 15 to 19	4	4	8
From 20 to 24	0	0	0
From 25 to 44	5	2	7
Above 45	0	0	0
	48	52	100

From the above table it will be seen that neither sex predominated decisively, while there is a marked difference in the distribution in the age classes. Eighty-five per cent were under 15 years of age and 15 per cent under 1 year of age. As individuals under 15 years of age only represent 34 per cent, and infants only 2.7 per cent of the whole Danish population, it is evident that subperiosteal abscess is most frequent in childhood and especially in infancy. The youngest patient treated was two months old, the oldest 43 years.

I may perhaps mention that in 48 cases the abscess was on the right side, in 52 on the left. Four of these cases were bilateral.

Etiology and Pathogenesis.—As there are various and practically important circumstances to be discussed under this heading, I purpose dealing with these two points in the nosology of the disease somewhat more exhaustively. There is particular reason to do so, as the literature contains but little which elucidates the etiology and pathogenesis of the subperiosteal abscess.

As to the nature of the primary ear disease: In the great majority of cases (78 per cent) the primary middle ear suppuration was of an acute nature. The primary acute middle ear suppuration was of specific nature in only a very few of the cases treated by me. Thus there were only four cases of measles, one of typhoid fever and two of scarlet fever; but there is no doubt that we should arrive at a very different result if we took our material from an infectious hospital, as it is beyond all question that the part played by scarlet fever

would be much greater. Tuberculous acute middle ear suppuration was doubtless the cause in three cases, as in that number of cases tubercle bacilli were found in the diseased bone, which was the transitory medium. In this connection I may mention that tubercle bacilli were found in the granulations in the mastoid process in one case out of 22 cases of chronic middle ear suppuration (with osteitis of the mastoid process).

The period during the acute middle ear suppuration at which the subperiosteal abscess appeared varied from two to three days to nine months (five cases) after the first appearance of the aural symptoms. By classifying the cases according to the duration of the primary aural trouble the following table is obtained:

Duration from 2 to 7 days	25 cases
Duration from 7 to 14 days	3 cases
Duration from 14 to 21 days	7 cases
Duration from 21 to 30 days	9 cases
Duration more than 1 month	25 cases
Duration unknown	9 cases
Total	78 cases

This would seem to prove that subperiosteal abscess in the mastoid region is an otitic complication, which appears, as a rule, either in the course of the first week of the acute middle ear suppuration or very late—more than a month after the commencement of the aural disease. On further investigation it will be seen that in all the cases in which the complication appeared at an early stage the patients were children and the majority infants. On the other hand, the disease may also appear in young children in the course of the middle ear suppuration, but this is rare in children under one year old.

In order to discover what bacteria were of etiologic importance, I had, in the majority of cases, the pus from subperiosteal abscess examined bacteriologically at the Pathological Institution of the Copenhagen Commune Hospital. The reason it was not done in all cases was not that it was forgotten, but that the pus was present in very slight quantity or was difficult to collect on account of the considerable intermixture with blood from the incision. This intermixture with

blood was doubtless also the reason why the bacteriologic examination gave a negative result in eight cases. The following are the forms of bacteria which were found:

Streptococcus	21
Staphylococcus	8
Pneumococcus	4
Streptococcus and staphylococcus	4
Streptococcus and pneumococcus	1
Streptococcus and other bacteria	2
Staphylococcus and other bacteria	2
Pneumococcus and staphylococcus	2
Various other bacteria	7

The cases in which only one kind of bacteria was found were, with only one exception, cases of acute middle ear suppuration.

The preponderance of streptococcus is conspicuous and is doubtless an indication that streptococcic angina is often the first stage in the course of the disease.

It is an obvious conclusion that retention of pus in the tympanum is an important etiologic factor. It is, of course, often difficult to prove the presence of this phenomenon. In several of my cases it was, however, possible to do so with certainty, viz., in cases where the otoscopic examination showed an absence of pus in the auditory passage and no perforation of the drumhead. This happened in 15 cases. Further, in several cases the tympanic membrane bulged out considerably and exhibited a small and very unfavorably situated perforation. In 7 cases this bulging out of the membrane took the form of a nipple, a condition most unfavorable to the flow of pus, partly because this form of bulging is almost always situated in the posterior superior part of the tympanic membrane, and partly because the perforation in such cases is always very small. Among other circumstances indicative of the retention of pus I may mention that in several of my cases the secretion in the tympanum was very slight and partially dried up; further in cases of acute suppuration of the middle ear there was a bad odor (23 cases); but we must, of course, remember that, when the patients are infants, acute suppuration of the middle ear is often accompanied by an unpleasant odor. Another phenomenon favorable to retention

was observed comparatively often, viz., swelling of the posterior wall (12 cases).

In cases of chronic suppuration causing mastoid subperiosteal abscess, the state of the tympanic membrane plays, of course, a less important part as an etiologic factor, as far as retention is concerned, the membrane in the great majority of cases being extensively destroyed. My investigations, however, show that a pathologic product is often present, which is certainly of moment in respect to retention, viz., cholesteatomatous masses. In 16 of my 22 cases of chronic suppuration the operation revealed a cholesteatomatous inflammation in the middle ear and in the mastoid process, which form of inflammation is, therefore, an important etiologic factor in the formation of abscess. Polypi I found only twice.

It is evident from the above that there is every reason to suppose that retention of pus in cases of acute suppuration of the middle ear is a prominent etiologic factor in subperiosteal abscess.

Among all my cases, however, there was not a single one of uncomplicated middle ear suppuration causing subperiosteal abscess in the mastoid region. In all the cases there was also an osteitis in the mastoid process, and there is no doubt that it is exceedingly rare not to find this phenomenon. The existence of an osteitis was proved in these cases by the resection of the mastoid process performed in all. The osteitis presented two prominent characteristics. The first was an acute inflammation of the bone, even in those cases where the primary disease was a chronic osteitis. The second, which was not observed in all, but in the majority of cases, was the presence of a diffuse process, rapidly causing considerable destruction of the mastoid process. To illustrate this latter condition, the case-books of the aural clinic of the Copenhagen Commune Hospital contain detailed descriptions of the macroscopic results of the operations and also schematic drawings showing the seat and area of the pathologic process. By the aid of these descriptions and drawings I have arranged the cases in three groups. The first embraces those cases where the osteitis included only the immediate surroundings of the mastoid antrum. The second includes the cases where the osteitis had spread over the greater part of the mastoid process, while the third embraces those cases where the whole mastoid

process was involved. These three groups represent, respectively, 10, 40 and 50 cases. In the great majority of cases it will be seen that the osseous process was very extensive. This is further evident from the fact that the dura mater was exposed in the majority of cases and the sigmoid sinus in no less than 59. Finally, the apex of the mastoid process was removed entirely in 20 cases.

Having dwelt upon the intensity and the extension of the osteitis causing subperiosteal mastoid abscess, I now mention certain circumstances which prove that comparatively frequently it is also of malignant character. This appears from the fact that it leads to endocranial complications with a frequency which is comparatively great in relation to the occurrence of these complications altogether. Thus, there were 13 cases of episinusitis, i. e., a formation of granulations on, and a thickening of the walls of, the sigmoid sinus. In 5 cases there was also a perisinus abscess. In 6 cases the operation revealed a phlebitis of the above mentioned sinus in connection with a formation of thrombus in the sinus. In 3 cases there was an epidural abscess, in 2 pachymeningitis externa, and in one case pachymeningitis interna. Cerebral abscess was found twice, and meningitis three times. As a consequence the subperiosteal abscess presents a high mortality, 9 per cent of my cases. This mortality rate corresponds exactly to that for all the mastoid operations performed in my hospital department, where, owing to the comparatively large number of intracranial operations, the mortality rate is high.

The question now to be asked is, How does the inflammation of the middle ear spread to the subperiosteal cavity and cause an abscess? According to most authors, the answer is very simple, the general opinion being that the pus from the cells in the mastoid process perforates the corticalis, thus reaching the subperiosteal cavity through the medium of the mastoid process. An investigation of my material, however, proves that this is the exception, not the rule, and that there are many ways by which the process spreads upwards to the surface.

It is a fact that a defect of the corticalis is present in the great majority of cases, as it was found in two-thirds of all the cases which I treated (67 cases), but somewhat more than one-fourth (27 cases) exhibited no change in the surface of

the corticalis, or only small, bleeding spots over the fovea mastoidea. In the remaining 6 cases there was no actual destruction of the bone tissue at the bottom of the fovea, but a slight softening of the bone.

It does not, however, follow, because the corticalis in the mastoid process in a large majority of cases displays no macroscopic changes, or is only slightly altered, that the disease has not reached the surface through the corticalis; for when no other path of communication between the primary disease of the middle ear and the periosteal process is discoverable it must be supposed that the inflammation is "metastatic" through the numerous blood vessels which the periosteum sends into the corticalis, especially in the mastoid fovea.

I will now briefly describe the various roads through which the primary inflammation spreads to the surface and causes subperiosteal abscess in the mastoid region, and also the pathologic changes revealed by operation.

What most frequently occurs is that an acute suppuration of the middle ear, after the duration of some time—sometimes only a few days, more frequently five or seven days, in a minority of cases after a longer period—causes an acute osteitis of the mastoid process, or that a chronic osteitis in the mastoid process becomes complicated with an acute inflammation. The osteitic process then spreads to the corticalis which, in an area varying from a quarter to half a square inch, becomes replaced by granulation tissue. This mass of granulations fills the corticalis like a stopper and is, in the majority of cases, situated in the mastoid fovea, on a level with the spina suprameatum and about a quarter of an inch behind it. It may also be found further down, but never much below the base of the tip of the mastoid process, as the sinewy fibers of the sternocleidomastoid muscle below this line merge with the periosteum and are intimately connected with the corticalis. I have, however, in several cases seen the process penetrate to the surface here and cause the formation of an abscess inside the fascia of the muscle, as also deeply seated muscular abscesses may be formed by penetration of the mastoid terminal cells. In a few cases the corticalis was perforated above the porus acusticus externus (3 cases), and the inflammation spread this way from the squamous antrum. In one case the patient was an adult. Frequently no pus at all, or very little,

is found in the above described granulation "stopper," or indeed in the osteitic process altogether, a regular pus-conducting fistula being but seldom met with. Sometimes two or three openings filled with granulations are found in the corticalis, and now and then it is full of holes like a sieve. Sometimes the destruction extends to the posterior superior wall of the osseous auditory canal and comprises a part of it. When the osteitic process penetrates to the surface and reaches the deep layers of the periosteum, a mastoid periostitis sets in, the periosteum becomes considerably thickened, afterwards soft and necrotic. As a rule, the inner surface of the periosteum is found covered with a layer of granulations. In a number of cases the process remains at this stage for some time, without forming any actual abscess. It may even spread further towards the surface without simultaneously forming pus in the subperiosteal cavity; in such cases the periosteum is generally destroyed in an area of from a quarter to half an inch. Through this opening a direct communication is established between the above mentioned stopper and a subcutaneous abscess cavity (32 cases)*, which cavity often attains to great dimensions. A subcutaneous mastoid abscess need not, therefore, always correspond to a true subperiosteal abscess.

In the majority of cases, however, a subperiosteal abscess is formed, with pus varying in quantity from a few drops to one-quarter of a liter. This pus may be fetid, especially in chronic cases. In one case gas was also developed. As a rule, the pus is of character pus bonum, but it often varies in color, is gelatinous, thin, etc.

This is the typical way in which the subperiosteal abscess in the mastoid region is developed, the development being often extremely rapid, especially when the patients are young children. Thus, a few days after the commencement of a suppuration of the middle ear a mastoid abscess may appear, upon opening which one may find the whole mastoid process converted into soft tissue.

In a much smaller number of cases (11) the inflammation does not spread from the middle ear through the mastoid process, although complicated with an osteitis in the latter, but along the posterior superior osseous wall of the auditory

*In two cases the subcutaneous abscess was of purely glandular nature.

meatus. Here we find a "granulation string" between the osseous wall of the auditory meatus and that part of the skin which covers the meatus and which is completely merged into the periosteum, forming with it one fibrous membrane.

When the inflammation spreads in this manner, the otoscopic examination reveals a very considerable bulging forward of the deepest part of the upper and posterior portion of the wall of the auditory meatus, so that the background is hidden more or less entirely. A remarkable circumstance is now and then observed when the inflammation is propagated in this manner, viz., that no pus is found in the mastoid region when the usual incision is made; it is only when the periosteum is loosened from the neighborhood of the spina suprameatum, where it always adheres more firmly to the bone, that the pus streams out. This form of abscess may perhaps be termed abscessus subperiostalis parameatum (3 cases).

A third way by which the inflammation in the middle ear may directly reach the subperiosteal cavity is through the fissura mastoidea-squamosa (3 patients, the eldest 14 years old). The pus oozes through the suture in which granulation tissue may be formed.

Finally, the pus may force its passage through an emissary vein (Körner), but I myself have never met with such a case.

This brings me to the end of my remarks on the etiology and the pathogenesis of the mastoid subperiosteal abscess, with which I have dealt somewhat more exhaustively on account of the new matter my investigations have brought to light. There remains to be mentioned in all briefness a few circumstances with regard to the subjective and objective symptoms and also treatment.

There is one subjective symptom which deserves particular notice, because it so often deceives both the patient and the medical attendant, if the latter has no experience with the disease in question. I refer to the absence of pain. It is very common for the patient to suffer pain, even severe pain, prior to the formation of the abscess in the mastoid region, which pain disappears as soon as the swelling behind the ear shows itself. Inexperienced observers, therefore, take this as a favorable symptom, imagining that the disease has culminated and hoping that the incision of the abscess will bring about recovery. Another favorable objective symptom perhaps en-

courages them in this delusive hope, viz., no temperature or a very slight rise. The following table illustrates this peculiarity:

Temperature (rectal)	99 ° or under	in 35	cases
Temperature (rectal)	99 °—100.5°	in 28	cases
Temperature (rectal)	100.5°—101.5°	in 22	cases
Temperature (rectal)	101.5°—102.5°	in 4	cases
Temperature (rectal)	.....over 102.5°	in 11	cases
		100	cases

A temperature of above 102.5° in cases of abscess in the mastoid region must always raise suspicions of intracranial complications (5 cases) and increase the gravity of the prognosis (4 deaths out of 11 cases where the temperature was above 102.5°).

I have nothing of special interest to say as to the objective local symptoms. They are, as is well known, swelling, which may be enormous (5 inches by 4 inches in one of the cases observed by me); redness, heat and tenderness of the skin of the mastoid region. I may perhaps mention that the sense of fluctuation obtained on palpation of the mastoid region when it is the seat of swelling is often delusive. Fluctuation was often distinctly felt, apparently, in cases of acute mastoiditis, where the operation revealed no accumulation of pus, the pseudofluctuations being caused by edematous swelling of the integument. On the other hand, smaller accumulations of pus under the periosteum often give no sense of fluctuation at all. Finally, I may mention that there is sometimes a communication between the pus beneath the periosteum and the pus in the auditory meatus, so that the pus may be forced out of the aural passage by pressing the swelling of the mastoid region (5 cases). The communication is brought about by the partial destruction of the cartilaginous part of the auditory meatus in conjunction with destruction of the lateral part of the porus acusticus externus, or by destruction of the cartilaginous parts of the aural passage where it adheres to porus acusticus externus.

Treatment may be dealt with briefly.

Many medical men, other than otologists, are of opinion that in order to cure the primary middle ear suppuration it is

sufficient to perform a simple incision (the so-called Wilde's incision), in cases of subperiosteal abscess in the mastoid region. I will not for a moment deny that this simple little operation may sometimes bring about the desired effect. But when one takes under consideration that in every one of the 100 cases on which this paper is based, there were osteitic changes in the mastoid process, that these changes were often intense and widespread, that they were comparatively often complicated with intracranial troubles, and finally, that the mortality rate was proportionately high, even when the patients came under treatment early, as was the case with the majority, then I must insist that Wilde's incision is absolutely inadequate, as the patient runs a very grave risk when a more radical operation is not resorted to. Several patients with serious intracranial complications came into the aural department of the Copenhagen Commune Hospital after Wilde's incision had been performed, and in all these cases the resection of the mastoid process and craniotomy came too late to save the patient. In my department, therefore, resection of the mastoid process is performed as soon as possible in cases of mastoid abscess, preferably the very day the patient is admitted. As a rule, in cases of chronic middle ear suppuration, radical resection of the middle ear should be performed, but when the patient is under 8 years of age the after-treatment is often extremely difficult on account of the child's resistance to change of dressing, and also because the parents are negligent in bringing the child for treatment. Therefore simple resection of the mastoid process is often resorted to in children, and the results, as far as my department is concerned, are, on the whole, extremely satisfactory. As regeneration is very slow, even in cases of simple resection, I have several times, about 10 or 14 days after the operation, when the swelling of the soft parts had entirely subsided, curetted the whole cavity slightly, and allowed it to fill up with a clot of blood and then made secondary suture. These experiments have given most encouraging results, the after-treatment, in the majority of cases, being considerably curtailed. If secondary suture is not performed the after-treatment in cases of simple resection is, as a rule, of very long duration (on an average 2¾ months), partly because the cavity to be filled by formation of granulations is so large, and partly because there are comparatively

often intracranial complications. Relapse is not infrequent (3 of the 78 cases of simple resection in acute middle ear suppuration).

RESUMÉ.

1. Subperiosteal abscess in the mastoid region is a fairly frequent otogenic complication, especially associated with early childhood.

2. Suppuration of the middle ear causing the disease is frequently acute, and the abscess appears at a very early stage, especially when the patients are young children.

3. It nearly always arises in connection with an osteitis in the mastoid process, and this osteitis is, as a rule, acute, even when the chronic osteitis already exists.

4. If there be a chronic osteitis in the mastoid process it will very often be found to be of cholesteatomatous nature.

5. The osteitis in the mastoid process accompanying the subperiosteal abscess in the mastoid region is generally very extensive and comparatively often complicated with intracranial troubles, especially diseases in and about the sigmoid sinus.

6. Wilde's incision for subperiosteal abscess in the mastoid process is, as a rule, absolutely inadequate. Simple resection of the mastoid process or radical resection of the middle ear should always be performed.

XXXIV.

OPERATIVE PROCEDURE FOR BRAIN ABSCESS OF OTITIC ORIGIN.

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Two years ago I reviewed my experiences with brain abscess of otitic origin. They were most disheartening. My patients had not died of meningitis, following the operation, but it seemed to me had died mostly from conditions the result of my operative procedure. The operative technic that I had used up to this time is described in Case 1. A long incision was made in the dura or a flap of the dura was elevated similar to that which we now use in decompression operations. The abscess was opened by a wide incision, explored with the finger and irrigated. My cases of brain abscess had been very few in number. They developed an infected hernia of the brain, which it seemed to me was just as serious as the original condition. I had followed the technic as described in our textbooks in the operation. I also attempted the removal of the hernia by procedures recommended in these books, but without success.

Two years ago I decided to try various methods of opening and draining these abscesses. The results of this work are included in this paper. Some of the cases operated were apparently hopeless, but were operated perhaps because of Macewen's dictum that abscess of the brain cases should die operated. One life I know was saved that was considered by all who saw her a hopeless case.

I realize that there is much to criticise in this work. I offer it simply to show what may be the results of various procedures used.

Case 1. Mr. B., coal miner, age 35, referred by Dr. C. B. Taylor, of What Cheer, March 23, 1906. Family history was

negative. Patient had never had syphilis. For several years he had suffered from chronic otorrhea. Several days before I saw him his ear began to discharge freely; temperature ranged from 100 to 104 degrees. Examination revealed much tenderness over the mastoid. There was a moderate discharge of pus; fundi, pupils and reflexes were normal.

A tympanomastoid exenteration was performed. The mastoid was necrotic. Neither dura or sinus was exposed. The roof of the antrum and tympanic cavity were intact.

The second day following the operation the patient slept so soundly for four or five hours that when aroused he would remain awake but fifteen or twenty minutes and then go to sleep again. He was examined carefully, but no other suggestion of intracranial complication was found. Temperature was 103°. Administration of a laxative was followed by a reduction of temperature to 100° and a disappearance of his drowsiness. The next morning he was walking about the hospital. Seven days after the operation the patient returned home. His temperature remained about 100°. He complained of pain on the side of his head.

On April 10th he slept all day. On waking he was not sound mentally. On April 12th I saw him again. He staggered a trifle while walking. He could not tell the name of any person, not even his wife or brother. He knew them, but could not call them by name. He knew which name belonged to each person.

I gave the patient pen and paper and ask him to write the sentence I gave him verbally. He could not do so. I next gave him a printed sentence to copy, which he did, printing it. When asked to read what he had copied, he could not do so. Ocular, patellar reflexes, etc., and eye grounds were apparently normal.

The operative wound seemed clean. Patient was placed in the hospital for observation.

His temperature remained about 100°. The patient walked about, smoked and did things as usual. He was somewhat irritable. Mentally he seemed to be all right, except for his memory of words. His lapse of memory for nouns was most noticeable. His memory for verbs and adjectives, etc., seemed to be fairly good.

After a few days in the hospital the patient went home.

He returned May 25th. He now presented the symptoms as before. In addition there was a double optic neuritis, vomiting, and motor disturbance in the right side. Immediately following the mastoid operation an exploration of the temporosphenoidal lobe was advised. Consent was secured only at this late date.

Operation.—On May 26th the patient was operated. The middle fossa was opened one and one-fourth inches above the external auditory canal. The opening in the bone was one and one-half inches in diameter. The condition of the dura over the tegmen antri and tegmen tympani was investigated. It seemed normal.

A semicircular flap of the dura was elevated. The flap was one and one-half inches long and one inch wide. The finger was introduced between the dura and the brain, and the region of the petrous portion of the temporal bone carefully examined. No softened area could be detected. A knife was introduced at right angles to the surface of the brain. Pus was found. About two and one-half ounces was removed. An incision in the cortex one inch long was made. The abscess cavity at the point of opening the dura was separated from the brain tissue by approximately one-half inch of cortex. The abscess cavity was cleansed, using the finger. Two drainage tubes were inserted and the wound dressed.

The patient recovered nicely; the pulse, which was 66 before the operation, increased to 88. The next morning his memory for words seemed normal. He told me that it was exasperating preceding his operation. If he wanted a cigar he knew just what he wished, but could not think of the name. That, he said, made him irritable. The patient improved nicely for three days. Then his temperature went up to 104°. A second abscess in the roof of the first was opened. This was done without the least pain, without the use of an anesthetic.

His temperature returned to normal in two days and remained there until June 16th, twenty-two days after the operation. During this time the patient was a walking patient. He had a large fungus-shaped hernia of the brain. It was soft, infected and possessed of an odor quite characteristic. Various procedures were resorted to in order to get rid of

this. Caustics were used. It was cut away in part. It was unclean and could not be covered by a plastic. The abscess cavity had ceased to discharge and drainage tubes had been removed on June 5th. On June 16th patient developed meningitis and died a few days later. At this time the original abscess cavity and neighboring parts were opened and no pus was found. The meningitis may have been due to efforts that were being made to obliterate the hernia. No postmortem was secured.

CASE 2. J. J., farmer, age 35, referred by Drs. Thielen and McDowell, of Grundy Center, November 11, 1907. Family history negative. No history of syphilis. Patient says whenever he had cold his right ear discharged. For two weeks he had not been feeling well, but had continued working in the cornfield until the day before. For three days had great pain in the right side of face. Temperature on morning of November 11th was 100°, evening 103°.

Examination.—Right ear discharging abundant foul-smelling pus. No pain over the mastoid. Patient's gait was unsteady. There was optic neuritis. For the last few hours the patient's mental condition had been getting poor. His memory was especially deficient.

During the night patient became delirious and remained so. The next morning there was marked rigidity of the muscles of the neck.

Diagnosis.—Abscess of the brain with meningitis.

Operation.—A tympanomastoid exenteration was performed. The bone overlying the antrum and tympanic cavity was perforated. There was a large extradural collection of pus. Not overlying the antrum, but internal to it, approximately one-half inch, was found a blackened area of the dura, in the center of which was a perforation from which pus was escaping. The opening in the dura was not enlarged. A piece of gauze was pushed up into the abscess cavity. The mastoid cavity was packed lightly and the wound left open. Moist dressings were applied. The patient died the next morning.

Postmortem Examination.—An abscess cavity was found in the temporosphenoidal lobe. Extending from it to the surface

of the brain was a distinct sinus from which (Photograph 1) pus was passing to and through the opening in the dura. This shows the exact condition which I have designated as abscess with discharging sinus. There was a suppurative meningitis.

This patient presented two interesting things. First. The patient must have had the abscess for a long time without any manifest symptoms. Second. This was the only one of the few abscesses with discharging sinus I have operated upon that have not recovered. The cause of death in this case was evidently meningitis, which was present before the operation. I use the term abscess with discharging sinus in this paper to indicate one where there is a perforation in the dura through which the abscess is discharging. This is connected with the abscess, as in this case, by a tubular canal, or the abscess cavity may extend to the dura at this point. In some of the cases reported later as brain abscesses there may have been only a large subdural abscess. Unless an instrument is passed into the cavity—and it is not advisable to do this—the extent of the pus cavity cannot be determined. I am under the impression that in most cases of any marked extent the cortex of the brain, at least, is also involved.

CASE 3.—J. D., farmer, age about fifty, was referred to me by Dr. Shuell of Parnell on April 23, 1908. Six weeks before he was injured in a runaway. He was dragged one-quarter mile by his team. His head struck a telephone pole. The injury was over the upper part of the right mastoid. For two weeks he was confined to bed. After this he attended to the details of his farming. Two days before I saw him he developed a severe pain in the right side of his head. I found the patient in a comatose condition. Reflexes were slow. On each side was optic neuritis.

A diagnosis of brain abscess was made.

A very bad prognosis was made and operation decided upon. A large triangular piece of bone was found depressed. The base was the upper portion of the mastoid. The apex was in the squamous portion of the temporal. This piece was about one and one-half inches long. The base was one inch wide. The apex was most depressed and had penetrated the dura. On removing the bone a discharging sinus in the dura was left. Starting from this point and extending downward an incision one and one-half inches long was made in the

dura and brain cortex. An abscess cavity containing about two ounces of pus was opened. This was cleansed, using the finger. This was packed with iodoform gauze and the external wound left open.

This cavity was packed daily. The patient recovered sufficiently to be about the house and yard and superintend his farm.

On May 25th he was brought to Iowa City. An enormous cerebral hernia was present. At the upper and lower portions of the hernia was a softened area. Each was opened and in each a little pus was found. The hernial mass seemed to be infected. Sixteen days later the patient died with symptoms of meningitis.

CASE 4.—Mrs. C., housewife, aged thirty-three, referred by Dr. Sams, of Clarion, April 24, 1908. Family history negative. No history of syphilis. When a child had much earache. Noticed a discharge from her left ear for the first time eleven years ago, when first child was born. Since then ear has discharged several times. Present attack began two weeks before with buzzing and pounding in the left ear. This was preceded by an attack of grippe. The buzzing in the ear was accompanied by some pain and discharge of foul-smelling pus.

Examination of patient showed: Left ear discharging foul-smelling pus. Much pain over the mastoid. Positive Romberg. Patient had a rolling gait. Temperature ranged from 101° to 105°.

On April 25th a tympanomastoid operation was performed. There was no change in the patient's condition. The patient was watched for four days. The temperature was fluctuating, ranging from 98½° to 104½°. Nystagmus made its appearance.

On April 30th the patient was reoperated. A septic clot was found below the knee. This was removed and the sinus opened above and below the clot. A well marked localized meningitis was found posterior to the ascending limb of the sinus. A small incision was made in the dura and the cerebellum punctured. The first two punctures gave no results. The third, at a depth of one and one-half inches, produced pus. About two drams of pus came away. It was fluid

white. The abscess cavity was packed carefully with a strip of sterile white gauze and a moist dressing applied. Instead of repacking, this strip was pulled out little by little each day. The patient's nystagmus disappeared. Temperature continued from 100° to 103°. Ten days after the operation the patient became restless. Temperature would rise and fall suddenly from 99° to 104°. Nystagmus and strabismus developed. A second cerebellar abscess was opened without anesthesia and packed as before. For the first time since the patient entered the hospital the temperature returned to normal. The nystagmus and strabismus were immediately improved and disappeared. Five days later temperature rose to 103°. For three days it oscillated from 98° to 103°. Nystagmus appeared again. A third abscess in the cerebellum was opened without any anesthesia. The temperature fell immediately below 99° and did not go above 99.5° for thirty-seven days, when the patient left the hospital cured. Patient has had no trouble since.

CASE 5.—Miss B. S., school girl, age nineteen, was seen in consultation with Dr. Whiteis of Iowa City.

One year before she had had tonsillitis, with earache in the left side, but no discharge from her ear. Several months after she developed pain in the side of her head. An otologist was consulted and a diagnosis of hysteria made. When I saw her she had a terrific headache, slight pain on pressure over the mastoid, temperature of 100°. Drumhead was normal. Retinal veins were dilated and there was a suspicion of optic neuritis. No motor disturbances. A mastoid operation was advised. Several days later a mastoidectomy was performed. I was not present at the operation, but the report was that there was evidence of chronic trouble in the mastoid, but no pus was found. This had no effect on the patient's temperature or pain. Two days after the operation I saw the patient with Dr. Whiteis again. Temperature was 102°. Patient was delirious. She recognized no one. Optic neuritis was present on the side operated. Reflexes on the opposite side of the body were increased. There was some rigidity of the muscles of the neck.

The patient was seen by Dr. Van Epps. A diagnosis of brain abscess with beginning meningitis was made. A very bad

prognosis was made and operation not urged. The father was very desirous of an operation.

The same day, assisted by Dr. Whiteis, the patient was operated. The brain cavity was exposed one and one-half inches above the external auditory meatus. The brain here seemed normal. The bone was removed downwards and inwards, removing the roof of the antrum and tympanic cavity. Here, between bone and dura, was found a collection of pus under pressure. Internal and posterior to the roof of the antrum was found a darkened area of dura, in the center of which was a discharging sinus. The dura was not covered externally with granulations. I decided to apply moist dressing and, if necessary, later increase the size of the dural opening. The conditions impressed me that the pus between dura and bone had been present only a few days. That the dural opening was recent. There was no perforation in the roof of antrum or tympanum that I could find.

The next day the patient's temperature was normal and mental condition excellent. Recovery was uneventful.

CASE 6.—Mrs. K., housewife, age about thirty-five, was referred to me by Dr. Meyer, of Gladbrook, October 15, 1908.

Two weeks before the patient had given birth to a baby. Since then she had been complaining of loss of vision and severe headaches. Patient had had a discharging ear on the right side for years. Examination revealed a chronic otorrhea on the right side. Optic neuritis was present. There was a left-sided paralysis of the seventh. Urine and physical examination was negative.

A diagnosis of abscess in the temporosphenoidal lobes of the right side was made. The patient was moved to the hospital, and on October 16th was operated. A tympanomastoid exenteration was peformed. The dura was exposed above the external auditory meatus and over the mastoid, antrum and tympanic cavity. It seemed normal. About one inch above the meatus a knife was plunged into the brain so as to penetrate just below the motor area. The opening in the dura was only one-half inch long. No pus was secured. Feeling sure it was there, a brain explorer was introduced, its arms separated and about two ounces of thick pus escaped. Without removing the instrument, a narow piece of sterile gauze was

packed into the brain cavity lightly and moist compresses applied. The day following the operation and for five days after the patient's condition was the very best. The abscess cavity was clean. The technic of this operation was what I consider the very best and a recovery was anticipated. On the fifth day the patient had a sudden terrific hemorrhage. The blood came from the wound cavity. It saturated the bandages and pillow. The patient died in seven minutes. Evidently a large vessel had ruptured. There was no post-mortem.

CASE 7.—Mrs. T., housewife, aged twenty, referred by Dr. Baker, of Stamwood, Iowa, May 26, 1909.

Six weeks before, as the result of a cold, patient had pain in left ear. Ear discharged for one week freely, then gradually ceased and had been dry for two weeks. There was then pain in the left side of the head, mastoid tender on pressure, temperature 100°.

Mastoidectomy was performed. A large extradural abscess was found on the middle fossa. The dura was covered with granulations. On searching the surface of the dura with the mastoid seeker a small hole in the dura was found. Pressure in the neighborhood produced but little flow of pus. There seemed to be a very small subdural abscess. Moist compresses were applied. Recovery was uneventful.

CASE 8.—Miss P., age sixteen, was referred to me in 1909 by Dr. Donovan. Patient had recently had measles, with a suppurative ear on the left side. The patient was unconscious, temperature 104°, pupils irregular, muscles of neck were rigid.

A diagnosis of meningitis of otitic origin was made. The mastoid was opened; the cells contained pus. On exposure of the dura it was found reddened and bulging. The dura was incised, with the expectation of performing subdural drainage. The brain tissue bulged into the opening to such an extent that ventricular puncture was decided upon. In attempting this puncture a subcortical area of softening was discovered. The cavity was packed lightly with sterile gauze. Some pieces of gauze placed between the meninges and moist compresses applied. Patient was not relieved and died the following day.

CASE 9.—Leonard K., school boy, age fourteen, referred by Dr. Bradley, of Esterville, July 27, 1909. Family history negative. Had much earache when a baby. Right ear had been discharging almost constantly since four years old. For two years the left ear had been discharging. Dr. Bradley had removed polyps from left ear three weeks before I saw him and another one week before. For the last three weeks patient had had pain in the back of the head and frontal region. He complained of being cold and had had a number of chills. Left ear was discharging. The tympanic cavity was filled with polyps. On July 24 patient was stupid. Dr. Bradley had made a diagnosis of brain abscess before sending him to Iowa City. Dr. Van Epps reported that there was no paralysis, irregular motor disturbances or other evidences of brain abscess. The fundi showed the retinal veins dilated, but no manifest swelling of nerve head.

On July 27th a tympanomastoid operation was performed. The mastoid was necrotic. The lateral sinus near the knee was exposed and covered with granulations. Before the operation T., P., R. were 96°, 50, 18. After the operation T., P., R. were 98.6°, 76, 18, and the patient began to clear up at once. He left the hospital August 7th apparently normal except for some deafness.

On August 11th his headache returned and he became somewhat stupid. Dr. Van Epps again examined the patient. He reported: Patient somewhat dull. Reflexes, station and gait normal. Blood examination 9000 whites and polynucleosis of 72%. Temperature ranged from 99° to 102°.

Ocular examination: O. D. pupil three and one-half millimeters; O. S. pupil three millimeters. Marked optic neuritis, with some diminution of vision in left.

On August 2, 1909, the middle fossa was exposed one and one-half inches above the external auditory meatus; the bone was removed down to the tegmen antri. An incision one-half inch long was made in the dura, one inch above the roof of the antrum. On opening the dura no fluid escaped. About three ounces of foul-smelling pus was removed. A second opening was made one inch lower, because the cavity was found so large, and a drainage tube was inserted in each.

The pus contained staphylococci and diphtheria-like bacilli.

After the operation the patient's temperature fell to 99°

and remained under 100° for seven days, when it rose to 101½°.

Then the boy's normal condition, which had been the very best, became dulled again, and a second abscess, posterior to the first, was opened and drained.

The temperature continued to vacillate from 98° to 100° after this. At times the boy was stupid; otherwise he seemed to be all right. On September 3rd, three weeks after the operation, he died suddenly without elevation of temperature; the pulse becoming exceedingly rapid, with respiration diminishing.

The postmortem showed a rupture of the abscess in the lateral ventricle. The following is the report of the postmortem examination made by Prof. Albert:

In the posterior portion of the inferior or third temporal convolution were two openings, apparently artificially made, leading to a suppurative process within. These two openings were about an inch apart, one slightly above the other. A cross section of the brain was made anterior to these openings, which demonstrated the existence of two distinct circumscribed collections of pus, separated by about one-fourth of an inch. One of these extended to within one-eighth of an inch of the external surface and produced a distinct bulging. A section made one inch anterior to the one just mentioned showed the two areas of pus still more widely separated—in this case one inch. The area near the surface was three-eighths of an inch in diameter and extended to within one-sixteenth of an inch of the surface. Just posterior to this area is an area of dense tissue—more dense than brain substance in consistency, of a translucent appearance, with the exception of a strip about the center, which is of a yellowish white color. A section of this tissue was taken for microscopic examination.

The other abscess measured one-half inch from above downward and one inch from side to side. It extended to just beneath the lateral ventricle. The surface of the lateral ventricle, just adjacent to it, was found to be inflamed and the ventricle itself to contain a slight purulent exudate. Another section was made from the brain, about three-fourths inch anterior to the last one, and which cut through the optic chiasm. This section revealed the presence of a considerable

amount of pus in the descending horn of the lateral ventricle. A section made one-half inch anterior to this revealed the presence of pus in the white substance separating the fibers anterior to the anterior end of the descending horn of the lateral ventricle. This continued anterior for another inch or to within two inches from the anterior end of the brain. The internal capsule was not involved at any part. It will, therefore, be seen that there were two abscesses, the smaller one about one-half inch in diameter and two and one-half inches in length. This one remained near the surface of the lower temporal convolution and led to the purulent localized inflammation of the meninges covering that portion. The other abscess began posteriorly two inches anterior to the posterior end of the brain, opening posteriorly through the artificial opening made into the middle or second temporal convolution and extended anteriorly and inward just beneath the lateral ventricle for a distance of about two inches, when it was continued anterior in the descending horn of the lateral ventricle, and extended some distance anterior to the anterior end of the descending horn, as already described, making in all a process four inches in length.

Microscopic Examination.—1. Portion of brain from inferior temporal lobe from a section made from the brain about one inch posterior to the optic chiasm. The greater part of the pathologic area consisted of subacute and partly chronic fibroplastic proliferation, along the center of which was a linear area which had undergone hyaline degeneration; to one side were a large number of pus cells (abscess).

2. Exudate from descending horn of lateral ventricle taken from section of brain cut through optic chiasm, or about one inch anterior to the section from which No. 1 was taken. Exudate consisted entirely of pus.

3. Section of brain with some exudate recognizable to the naked eye taken from the white substance of the temporal lobe anterior to the anterior end of the descending horn of the lateral ventricle. The exudate, which had separated some of the brain fibers, consisted entirely of pus.

It is interesting to note the chronic fibroplastic proliferation with the hyaline degeneration. This shows a strenuous effort on the part of the organism to overcome this condition. It

also shows that this pathologic process must have been present for a long time. The absence of motor disturbances in such a large abscess is also noteworthy.

CASE 10.—Mr. M., farmer, age sixty, was referred to me by Dr. Myler, of Lebanon, S. D., on August 11, 1909. In April last patient suffered from la grippe, with pain on the right side of his head. At no time had there been a discharge from his ear.

Examination showed drumhead slightly reddened. Mastoid region little edematous and painful on pressure. Ocular and general examination negative. Patient was much emaciated and weakened.

A mastoidectomy was performed. The whole of the mastoid was diseased. There was a perforation of the inner table of the middle fossa and a large extradural abscess. After thorough removal of the bone a large perforation of the dura was found. It was large enough to allow the passage of the handle of the scalpel. This opening was covered by a mass of granulations. Pus continued to discharge through this perforation. The handle of the scalpel was introduced one inch in the opening. It gave the impression that there was a large superficial cavity.

A little gauze was packed in this cavity and moist compressed applied. The cavity was packed daily for one week; then, the discharge having ceased, it was left out. Patient recovered.

CASE 11.—E. E., school boy, age sixteen, was referred to me by Dr. McLaughlin, of Washington, Iowa, on November 24, 1909. When two years old he had scarlet fever, with abscess in left ear. This was accompanied by an abscess back of the ear. About one-half of the time since, the ear had been discharging. Recently he had been having very severe pain on the left side of his ear. Physical examination negative. Retinal veins in the left eye were distinctly dilated. Blood count—leucocytosis 26,600, polynucleosis 65%. Temperature 99° to 100°.

A tympanomastoid operation was performed. The bone over the dura of the middle fossa and over the lateral sinus was necrotic and perforated. The sinus was covered freely with granulations, as was also the dura in the middle fossa. There

was a large extradural collection of pus. Above the lateral sinus at the knee was a place where pus continued to ooze up through the granulations, which were very abundant here. Pressure on the dura in the neighborhood caused a flow of more pus. A diagnosis of brain abscess was made. The perforation of the dura was so large that the handle of the mastoid seeker could be readily introduced. This was passed in at right angles to the surface of the dura a distance of one and one-half inches, indicating a rather large cavity.

A strip of gauze was passed into this cavity about one and one-half inches and moist dressing applied and the wound left wide open. For one week this sinus discharged. A piece of gauze was introduced daily as long as there was any discharge. One week later the wound was closed by a plastic operation.

Recovery was uneventful.

CONCLUSIONS.

1. The opening of the dura should be such as to prevent, if possible, a hernia of the brain. A hernia once formed is almost impossible to get rid of. It is also very difficult to ever get in clean, so as to allow of its being covered by a plastic operation. In cases 1 and 3 this hernia seemed to be the ultimate cause of death.

The incision in the dura should not be more than one inch long. One-half inch is usually long enough. This will allow of all the manipulation that should be done. It allows the introduction of a narrow strip of gauze into the wound cavity and the daily changing of the drain.

It is better to run the slight risk of getting poor drainage than to get a large hernia.

2. In every case of brain abscess a discharging opening in the dura should be sought for. If found it may be stretched, but the dura should not be cut. If nature has been holding this process in check without an opening in the skull and none or little drainage, with a free exit from the sinus, a little gauze drain, to keep it open, and a moist dressing, to readily absorb the discharge, nature should and usually does overcome this process. The nature of the brain tissue is such that it tends to collapse and force the pus from the sinus if present. Six of the cases reported had discharging sinuses.

Case 2 died because meningitis was present before the operation.

Case 3 died, I think, because of incising the dura and getting a hernia. This case I would now treat by simply placing a piece of gauze in the sinus, and applying moist dressing. If necessary, the brain can be cut open later.

Around this discharging sinus at its dural opening nature had formed protective adhesions which should not be disturbed. The wall of the sinus in the brain is a good, protective one and should not be injured in passing gauze. The photograph accompanying Case 2 shows these conditions nicely.

3. The prognosis in brain abscess is much influenced by whether a discharging sinus is present or not. That is, whether nature has performed the operation on the brain or not. In my few cases seen later in this series I have made a good prognosis. In two cases, Cases 10 and 11, this was done when visiting physicians considered the cases hopeless. Recovery in each was uneventful. This sinus is not always easy to find. In Case 2 it was located inwards so far as to make its discovery difficult.

The size of the abscess has much to do with the prognosis. I doubt if any procedure would have drained Case 9 so there would have been recovery.

4. Manipulation of the wound. The advantage of exploring an abscess cavity with the finger or instruments will not compensate for the damage done to the limiting wall of the abscess cavity and the making of a large opening with danger of hernia.

Most secondary abscesses following operations I believe to be due to this cause.

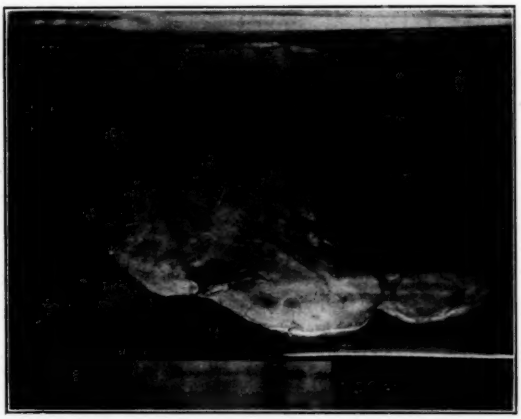
I prefer to explore the brain with brain explorer with separable arms. When pus is found the gauze should be passed between the arms of the instrument and the instrument withdrawn, leaving the gauze in position.

5. Drains. The use of tubes for drainage has seemed to me to result in damage of the limiting wall when the brain collapses. Tubes will stop up and must be changed. In my cases my assistant noted carefully the depth of the abscess and the direction of the puncture. Daily he has changed the

gauze. The new strip is slipped in by means of a blunt prove. The first few days, on removal of the gauze, a little pus will come away. As soon as this disappears the gauze is left out. The size of the gauze drain depends on the size of the abscess.

I realize that gauze is one of the best materials for draining. In abscesses of the brain the surrounding tissue exerts a constant gradual pressure. Feeling with the finger in an abscess cavity day after day, as I once did, demonstrated this nicely.

6. Exploratory puncture should not be made with a needle or narrow-bladed knife. In Case 6 if the brain explorer with separating arms had not been used the pus would not have flowed.



Abscess of brain (temporal lobe) secondary to chronic suppurative otitis media, showing discharging sinus.

XXXV.

THE RESECTION OF BONY DEFLECTIONS OF THE NASAL SEPTUM.

By Otto T. Freer, M. D.,

Chicago.

In almost all deflections of the nasal septum bone must be removed in order to obtain perfect breathing after a submucous resection; nevertheless, experience has shown me that many operators take away only the cartilaginous portions of an osseocartilaginous deflection and leave its bony part to continue to obstruct the nostril. Before I appreciated the need of a complete removal of all deviated or thickened bone, I, too, sometimes contented myself with cutting out only the bent cartilage, always regretting my conservatism, and in several instances being obliged to perform an extensive bony resection in a second operation in order to obtain a satisfactory result.

The chief reason why bony deviations are so often left untouched is the difficulty of their removal, a difficulty increased by the insufficient access to the operative field obtained in some methods of operation. In addition, the fear of making a perforation during the denudation of the bone deters many from resecting it, especially that portion called the ridge, after the cartilage has been successfully removed. The thick periosteum which envelops the ridge may hide it so completely that operators may, as I have seen, fail to find it at all.

While my earlier bony resections proved difficult, changes in the technic have made those of my later work so uniformly satisfactory and free from perforations that I have been impelled to describe in this article my present method of the removal of bony deflections.

Much of the difficulty experienced by operators in taking away the bony portion of deviations lies in an imperfect conception of the often confusing anatomic peculiarities of the skeleton of deflections, and for this reason the surgical portion

of this paper is preceded by some anatomic description of the chief divergences from the normal presented by bony deflections in my series of 428 cases.

ANATOMIC PECULIARITIES OF BONY DEFLECTIONS.

In this description, for the sake of convenience, the bony wall arising from the nasal floor created by the blending of the anterior portion of the vomer, the incisor crest and superior maxillary crest is designated collectively by the customary term of "the ridge," used above.

One of the most striking of the anatomic divergences found is the displacement of the septal cartilage from its proper position on top of the ridge to an attachment to its side (Fig. 1), so that the cartilage overlaps the bone. In the normal straight septum the inferior angle and posterior inferior border of the quadrangular cartilage of the septum rest vertically upon the narrow, rough and often channelled anterior border of the vomer and superior border of the incisor crest, which form the top of the ridge, the quadrangular cartilage, growing in proper proportion to the bony frame containing it, standing centrally and vertically upon an upright ridge (Fig. 2^{1}). In nontraumatic deflections, however, the cartilage either grows too fast for its bony frame, and so becomes too large for it, or else the frame stays too small. Under both these conditions the cartilage distorts the frame by pressure, bending out its margins by the wedging force of its growth, so that the vomer, incisor crest and perpendicular plate, with which the cartilage articulates, are bent outward, the ridge becoming inclined toward the nasal floor and, in curving over, causing the rough articular surface upon which the cartilage rests to look to the side, instead of upward. At the same time, the pressure of the growing cartilage spreads this articular surface by forcing downward the one of its margins which comes lowest in its new position, the osseocartilaginous synarthrosis between the cartilage and ridge thus becoming not only displaced from the top to the side of the ridge, but also greatly widened (Fig. 2^{3}b). The lower boundary of the so displaced and broadened rough articular surface develops into the sharp bony ledge so often sawed off as an exostosis, this ledge being overlapped and covered by the cartilage which ends inferiorly in a sharp angle (Fig. 2, ^{3}c), corresponding to the apex of the ledge of bone. The overlapping of the cartilage

in the displacement and broadening of its synarthrodial articulation with the ridge is thus the cause of the cartilaginous covering found upon bony crests and ledges which have been sawed away, and it is my experience that almost all bony and cartilaginous ledges and crests are thus merely the horizontal angle of deflections in the naris of the convexity.

The tilting over of the articulation between cartilage and ridge, together with its broadening, necessarily places the sharp horizontal angle or crest of the deflection in the naris of the convexity at a lower level than the groove of the concavity in the other nostril (Fig. $2^{3}g$). For this horizontal angle corresponds to the lower margin of the laterally displaced articular surface, while the groove of the concavity marks exactly its upper margin—that is, the position of the anterior border of the vomer. For this reason even after the cartilaginous deflection, including the cartilaginous overlapping described, has been entirely extirpated, the groove of the concavity indicating leaning over of the ridge into the other nostril will nevertheless be found to persist until, in addition to the cartilage, the deflected ridge, together with its tilted articular surface, is cut away to the bottom. Only when this has been done will the groove of the concavity be found effaced. It is my experience that until it be effaced, the obstructed naris of the convexity has not been sufficiently freed to insure perfect breathing after the healing is complete. Very often the bent-over ridge in the naris of the convexity lies so near the nasal floor that it is overlooked, unless the operator heed the indication of its presence given by the persisting groove of the convexity higher up in the other nostril. If he finds the groove present, he should, therefore, seek and resect the concealed ridge.

The overlapping of the ridge by the cartilage almost always takes place in the naris of the convexity of the deflection; but I have found a few instances where the overlapping occurred in that of the concavity, the cartilage, in forcing over the ridge, tilting its synarthrodial junction with it into the opposite nostril (Fig. 2^{4}).

It is obvious that the placing of the cartilage beside the bone in the overlapping process doubles the width of the septum, which thus obstructs the nares by its thickness as well as its deviation. The removal of this excessive thickness, in

the submucous resection, is one of its greatest advantages over the fracturing operations, which leave it.

The overlapping of the cartilage, unless understood, is confusing; for the operator, expecting to find the yielding mucosa of the opposite naris underneath the cartilaginous deviation after its removal, is surprised when confronted by the resistance of the invisible bony wall of the ridge, hidden in its envelope of periosteum. The resection of this concealed bone may seem so difficult as to tempt him to leave it intact, to the detriment of his patient.

The arrangement of the periosteum and the perichondrium in bony deflections is also complex. These membranes do not merely form a continuous sheet upon one side of the septum, like paper on a wall, but both the ridge and the cartilage have their own periosteal and perichondrial envelopes, the periosteum of one side of the ridge crossing over its top into the other nostril, while the perichondrium also forms a separate compartment for the cartilage which envelops its lower border, thus making the perichondrium likewise continuous from one nostril to the other. (Fig. 2.) Externally the envelopes of the ridge and of the cartilage are united where they are in contact, and they are covered by a continuous sheet of mucous membrane in each naris. On account of this complicated arrangement of the two envelopes described, the elevation of the covering of one side of the septum may often be easily made with a dull elevator as far downward as the cartilage extends, but becomes impossible below this without a keen blade, because the bottom of the envelope of the cartilage has been reached, and that of the ridge has not been opened. To, therefore, attempt to forcibly bare the entire side of the septum with a dull elevator results in tearing the coverings of the septum along the line of the crossing of the periosteum into the other nostril.

While a deflected ridge almost always arches over and overhangs the nasal floor, this overhanging may be absent and the hollow space under the bent-over ridge may be filled out with bone, so that on the convex side of the deflection the ridge forms a straight wall, and yet the usual groove, indicating its leaning over, exists in the naris of the concavity. (Fig. 3b.) A ridge of this kind is necessarily wedge-shaped, and of great breadth at its base, thus depriving the bottom of

the naris of the convexity of a great part of its normal width. The condition is a very confusing one; for while the naris of the concavity presents the usual horizontal groove, or hollow, seen in a deflection involving the ridge, there is no evidence of the deflection in the form of a projecting angle in the other nostril, which seems very narrow, but has a straight bony septum. Ridges of this kind must be extirpated to the very bottom, in order to give normal width to the narrowed naris and place the septum in the median line.

A more frequent peculiarity, the opposite of a deflected ridge which does not overhang at all, is found in a ridge which leans over so excessively that it lies almost flat upon the nasal floor, so that the side which comes uppermost may even be taken for the latter.

While the ridge is commonly buried in tough, thick, firm, adherent periosteum, the posterior part of the bony deflection, formed by the junction of the vomer and perpendicular plate of the ethmoid bone, is usually easy to denude of its coverings. This posterior part forms a horizontal angle, which I have called the horizontal bony V (Fig. 4c, 5c), whose apex projects into the naris of the convexity toward the lower turbinated body, sometimes pressing firmly into it. The upper plane of the angle is created by the bent-out perpendicular plate, and below this usually by the broad articular surface of the displaced osseocartilaginous synarthrosis described, while the lower plane of the angle is created by the portion of the vomer arching over the nasal floor below the articular surface. (Fig. 4.) Attached to the rough articular surface, and following the side of the vomer, often far back toward its posterior border, is the overlapping portion of the cartilage of the septum, which appears in the form of a long strip characteristically indented on the surface which is united to the bone. (Fig. 4d.)

Instead of forming the acute angle of a horizontal V, the posterior part of the bony deflection may appear bowed, as a vertical capital C. The bone of the V or the C may be very thick and strong in front, but usually, some distance behind, the operator comes upon very thin, paper-like bone, into which the V merges.

The perpendicular plate of the ethmoid bone may be vertical in front and only deviated behind, where it joins the vomer

in the V. Not rarely, however, the deflection of the perpendicular plate reaches forward, projecting outward into the middle meatus and against the middle turbinated bone, along their whole length.

Unusual thickness of the bony parts of the septum may cause quite as much obstruction to breathing as their deflection. I have encountered ridges one-half of an inch, and perpendicular plates three-sixteenths of an inch in thickness. Even if straight, a very broad ridge should therefore be taken away, as after the resection of the cartilage it supports nothing, and its removal gives great space.

The proportionate area occupied by the cartilage and bone in a septum varies greatly. In some rare cases the septum is almost entirely of bone, the ridge rising to a great height above the nasal floor, the large pendicular plate descending low, and the anterior border of the vomer being steep and coming far forward. The converse of this condition is presented by other septa, less rare, where the cartilage occupies an unusually large area, the margins of its bony frame receding before it, so that the anterior border of the vomer is found far back in the naris, and the perpendicular plate high up, while the ridge may be scarcely indicated.

Only the typical anatomic peculiarities of bony deflections have been mentioned here, the unusual ones not being described. The latter, however, all show in some measure their relation to the typical conditions.

THE RESECTION OF BONY DEFLECTIONS.

The surgical description in this article presupposes the completed resection of the cartilaginous portion of the deflection and the use of the author's reversed L mucosa-perichondrium flap, which gives the free access to the field of operation which is indispensable for the exact excision of the bony deviation. While foreign to the subject of this paper, the difficulty others have had in uplifting this flap and the fact that most operators do not understand its advantages, make a word in regard to its creation seem advisable, especially as I have improved upon the method of making it, previously described by me.

The making of the flap is begun with a horizontal incision, which follows the base of the septum close to the nasal floor, from a point to which it is intended the vertical incision shall

descend, well forward into the nasal vestibule, usually into the cutaneous portion of the septal covering. The uplifting of the flap (Fig. 6a) is begun from this horizontal incision by means of keen, round-bladed knives of suitable form, found in my set of instruments; for the coverings are always adherent along the bottom of the septum, so that a dull elevator should not be used. Often it is not possible to uplift the perichondrium together with the mucous membrane at the bottom of the intended flap, and in this event a little of the detached mucous membrane is uplifted alone at first in order to expose to view the perichondrium upon the cartilage, the perichondrium being then cut through with the blade and its elevation started. This permits the introduction of a dull elevator under the perichondrium and its ready detachment upward and backward to the intended site for the vertical incision, which is thus made after the detachment of the flap. The dull elevator is then withdrawn and a keen-edged one is introduced under the perichondrium in its place, and passed backward underneath it to the intended site for the vertical incision, which should be placed as far back on the septum as possible, regardless of the presence of a vertical angle of deflection in the cartilage. The sharp elevator is then punched through the covering at the site selected from beneath and made to cut up and down until the vertical incision is completed. This method of making the flap is preferable to the one of my older descriptions, as it permits the creation of a very large and untorn flap, which gives the widest access to the operative field. When completed the flap is uplifted forward to its base and then held out of the way with one of my retractors used by an assistant, who, with another retractor, pulls the wing of the nose outward. A third retractor, held by the operator, opens the nostril downward, the three acting as a trivalve speculum, as shown in the illustration.

After the resection of the cartilaginous deflection its remains, clinging to the ridge along the bottom of the septum, are to be pared away with the thin spatula blade of a sharp elevator, in order to expose to view all of the periosteum of the ridge on the side of the convexity. The cartilaginous strip described as extending backward upon the rough articular bony surface of the osseocartilaginous synarthrosis upon the side of the vomer must also be freed from its attachments and

removed. For this purpose a long, sharp elevator is used to separate the cartilage from the bone, and also to cut around the outer surface of the cartilage, to detach it from the mucous membrane of the convex side of the deflection, to which it is usually firmly united, a dull elevator being rarely able to free it. When disconnected from its surroundings, the cartilaginous strip may be drawn out with dressing forceps. It often extends very far back, and its removal may require patience.

The next step in the operation is to find the concealed ridge by feeling for it through its periosteum with a dull elevator, palpating with this upward from the floor of the nose until the position of the upper border of the ridge is made evident and outlined by the elastic yielding of the mucous covering of the side of the concavity of the deflection above it. The line of the upper border of the ridge having been thus determined, a cut following it is made down upon it from above to the bone (Fig. 7) with the round-bladed knife E of my set of septum instruments. (Fig. 8E.) This splits the periosteum along the whole length of the top of the ridge. The periosteum in the naris of the convexity is then pushed away from the ridge down to the nasal floor with a little raspatory (Fig. 8), whose blade is curved on the flat. This instrument is described in the *Journal of the American Medical Association,* December 4, 1909.

When this instrument has detached the periosteum from the top of the convexity of the ridge, it is directed backward along the base of the septum in order to denude upon the same side the lower plane of the convexity of the horizontal angle of the bony deflection, or V, this lower plane being represented by the deflected vomer overlying the nasal floor.

The next step is the detachment of the periosteum from the ridge and V on the side of the naris of the concavity. This must be done cautiously, for it is this portion of a submucous resection which, in my experience, is the most apt to create a perforation, the penetration into the other nostril occurring unexpectedly somewhere along the top of the ridge. Since employing the raspatory mentioned, I have been able to avoid this type of perforation entirely, and I regard this implement as a safeguard against the accident. In order to bare the side of the ridge in the naris of the concavity (other nostril) the raspatory, held firmly close to its cutting end, that it may not

slip, is made to progress cautiously over the top of the ridge and down its other side to the floor of the nose, the cutting edge hugging the bone. (Fig. 9.) The operator may always know from his sense of touch that he is maintaining bony contact, and, so long as he feels it, he may be sure that no perforation can occur. The raspatory climbs over and down the other side of the ridge in a direction which crosses it as nearly as possible at right angles. When the ridge has been thus denuded upon both sides and lies bared to view, the raspatory is directed backward into the hollow of the bony V, and the usually easy denudation of its concavity is completed. When the entire bony deviation seems detached from its coverings and ready for removal, the denudation should be carefully revised with the raspatory and a dull elevator, in order to make sure that there are no regions where the coverings are still adherent. Such places are especially apt to exist near the nasal floor on the side of the concavity of the deviation and, if overlooked, generally lead to the tearing out of the attached piece of mucosa, and a perforation when the bone is removed.

The open view of the operative field offered by the reversed L flap, recommended by me, makes the freeing of the bony deflection under the guidance of vision possible everywhere, except along the invisible bottom of the ridge on the side of the concavity, and this perfect inspection of the line of advancing denudation is the best safeguard against tears and perforations. All the work requires minute and close seeing. The illumination is obtained from the Kirstein light, the only one I have found suitable for the near approach of the eye required.

While the periosteum of the ridge is, with rare exceptions, intimately united to it, that in the hollow of the bony V is generally very easy to uplift.

For the removal of the bone I employ the reinforced Freer-Gruenwald forceps (Fig. 8), described by me in previous articles, and the small chisel of my set of septum instruments. Many of the chisels suggested for the resection of the bone are too large, hence obstructing the view during their use, and their excess in width makes them liable to cut through the mucous coverings beyond the limit of the bony cut they are making. A V shape for the chisel blade is unnecessary, as the simple flat blade may be better controlled, may be kept sharp, and requires less propelling force.

Since I have reinforced the forceps I have never met with bone in the septum which it will not cut through with ease, the thickest I have used it upon being three-eighths of an inch thick.

The removal of the ridge I now always begin with the chisel, cutting along the floor of the nose, through the incisor crest and back under the vomer as far as it has no bony connection with the perpendicular plate above. Then by lifting the shank of the chisel the undercut fragment of bone breaks off at the rearmost end of the cut. In this manner all of the deflected or thickened ridge, as far back as the bony V, is taken out in one piece. I know that the chisel is also used back of this anterior portion of the bony septum to detach the bony V above and below, this detachment being followed by breaking out of the thus partly severed fragment with dressing forceps. But I regard this as a dangerous practice. The frail perpendicular plate in this portion of the bony septum is liable to be shattered by the chisel, and far-reaching fissures may be created by the breaking away of the fragment still attached behind. That this is no imaginary danger is shown by a case related to me by Professor Bernhard Fränkel and Professor Edmund Meyer, of the Charité clinic, in Berlin, in which blindness of one eye followed the breaking out of such a fragment in a submucous resection, a fissure having evidently traversed the sphenoidal sinus into the optic foramen. In another instance, of which Professor Koschier, of Vienna, told me, the entire vomer was twisted out of the nose, and recently I have heard of still another instance of this accident. It is permissible, in my judgment, to break out fragments of bone posterior to the junction of the vomer and perpendicular plate, if the bony V has been completely severed from its connections above by means of the punch forceps, and when the thus partly detached bone is found to be movable and obviously almost severed from its surroundings. In this manner I often remove the entire bony V in one piece. In the majority of cases, however, it is easy to cut out the V, piece by piece, with the punch, in a few minutes. Firm bone should never be broken out with seizing forceps. The fixed blade of the punch forceps is used as a guide in applying the forceps for its bite, this blade entering into narrow places, as where the bony V described presses into the inferior turbinat-

ed body, and must be wedged away from it with the forceps blade before the instrument may be applied to the bone. For this reason I regard both a right and a left opening forceps as a necessity in the operation.

Deflections of the perpendicular plate outward should be followed as high up as they extend toward the nasal roof. They are easy to excise with the punch, and their removal clears the middle and superior meatuses.

The actual excision of bony deviations seldom takes more than a few minutes; it is their denudation which requires time and care. The cutting away of the ridge is sometimes followed by free bleeding from the cut vessels of the bone. In all but rare cases, however, the hemorrhage during even the most extensive bony resections is insignificant, and sometimes almost absent. Bleeding hiding the field of operation is best controlled by an application of the flake crystals of pure cocain, on a swab moistened with adrenalin, according to the method I employ for the local anesthesia.

In men the ridge is often very broad and thick, and strong blows of the mallet may be needed to chisel it away. The angle of the V and the perpendicular plate may also be very thick; but after these parts have been removed, a thin, egg-shell-like continuation of the deflection is usually found in the posterior part of the vomer, which may generally be taken away by twisting it out with the dressing forceps.

When all the bony deviation seems cut away, the flaps are to be replaced. If they lie down flat, the resection is complete; if not, the projecting fragment holding them away must be sought for and removed.

I have never known harm or a permanently flaccid septum to result from even extensive resections of the bone of the septum, and have never felt the need of inserting pieces of cartilage between the replaced coverings in order to stiffen the partition, as is recommended by Max Halle. In concluding this article, I advise a complete extirpation of bony deflections, to prevent the disappointment following an incomplete resection. For the after-treatment, I refer to my other articles on this subject. Much of what I have written here concerning the removal of bony deflections represents my later technic and is not to be found in my previous publications, a list of which is subjoined.

34 Washington Street.

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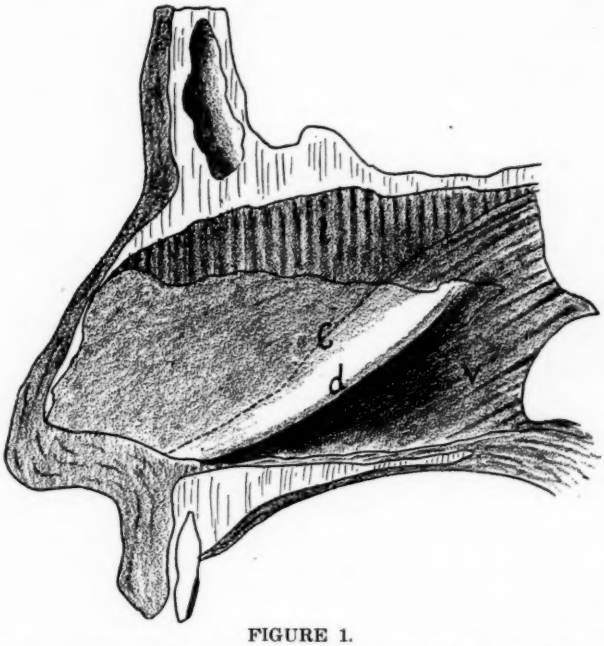


FIGURE 1.

Lateral view of the skeleton of the nasal septum. 1, Perpendicular plate of the ethmoid bone; v, Vomer; c, Cartilage of the septum overlapping the vomer upon the displaced articulation and ending in a sharp cartilaginous ridge, d.

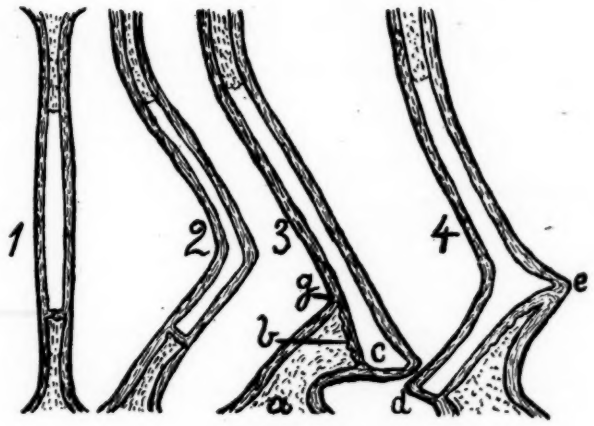


FIGURE 2.

Vertical section of the nasal septum about its middle. 1, A straight septum, showing the cartilage resting vertically upon the ridge; 2, A view of a horizontal angle of deflection as it would occur if the articulation between cartilage and ridge remained unaltered; 3, Actual changes in the articulation and structures of the deflected septum as they are commonly found; a, Overhanging ridge enveloped in its periosteum; b, The articular surface displaced into the naris of the convexity with the cartilage; c, Overriding the bone. The individual perichondrial and periosteal envelopes of the cartilage and bone are shown; g, Groove of the concavity of the deflection; 4, Exceptional overriding of the ridge by the cartilage in the naris of the concavity instead of the convexity, creating a ledge, e and d, in each naris.

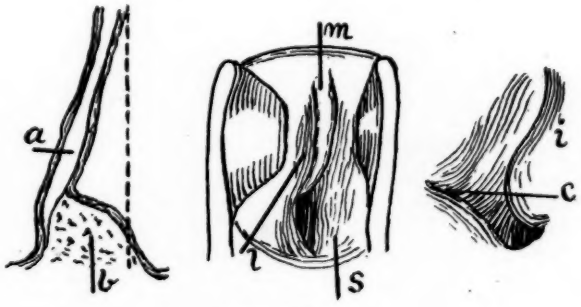


FIGURE 3.

a, Cartilage of the septum laterally attached to ridge, b, which does not overhang. The dotted line shows median position the septum should occupy after the resection. l, Inferior turbinated body; m, Middle turbinate; s, Vertical wall of ridge in narrowed naris; c, Groove of concavity in open naris; i, Inferior turbinate.

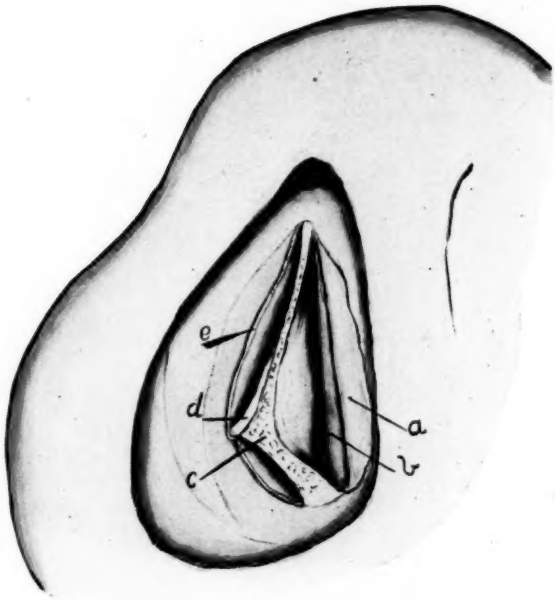


FIGURE 4.

View of the horizontal bony V, or angle of deflection, pressing into the right inferior turbinate. a, Anterior reversed L flap; b, Inner surface of mucous covering of the concavity; c, The bony V; d, Overlapping portion of the cartilage of the septum extending backward upon the side of the vomer as a cartilaginous strip; e, Detached portion of the mucosa of the convexity, which lies behind the L shaped flap.

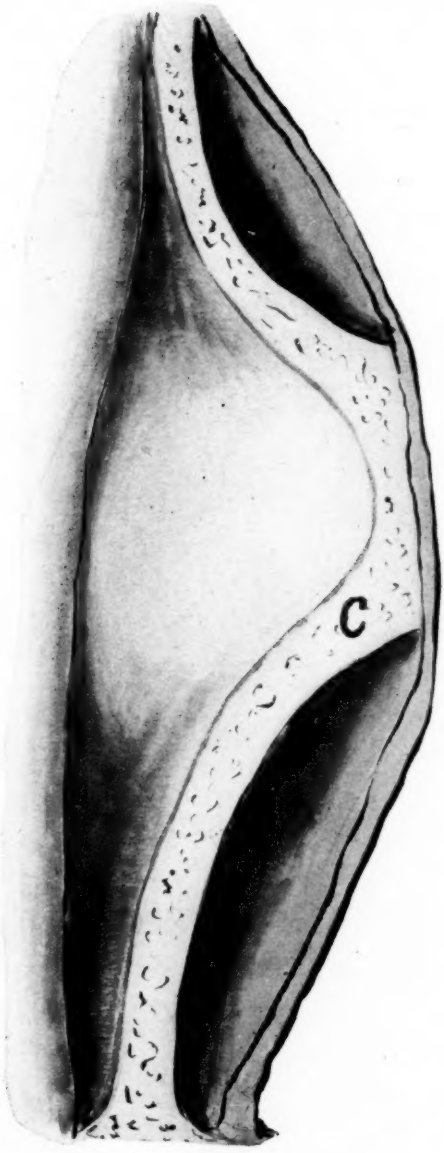


FIGURE 5.

Horizontal bony V, c, denuded ready for cutting away.

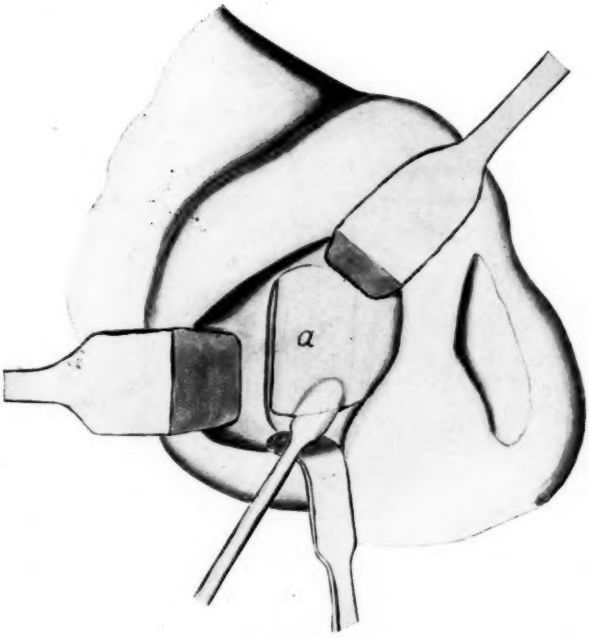


FIGURE 6.

The right nostril is held open with retractors. The reversed L flap, a, is being elevated from the cartilage from its bottom with the roundbladed knife.

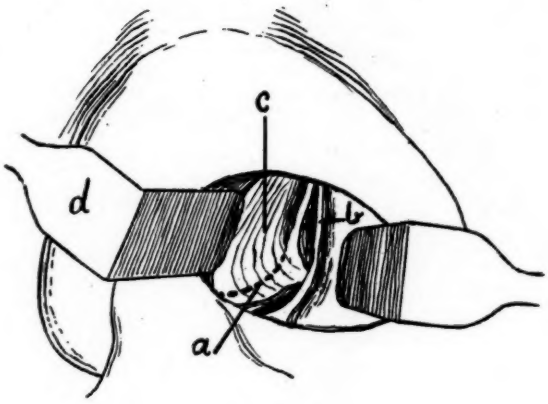


FIGURE 7.

The left nostril is held open with retractors. Ridge, a, concealed in its envelope of periosteum; the dotted line shows the incision which splits the periosteum along the upper border of the ridge; b, Cut edge of the uplifted mucous covering of the posterior part of the deflection; c, Perichondrial surface of the mucous covering of the opposite nostril (naris of the concavity of the deflection); d, Retractor holding forward the anterior (reversed L) flap.

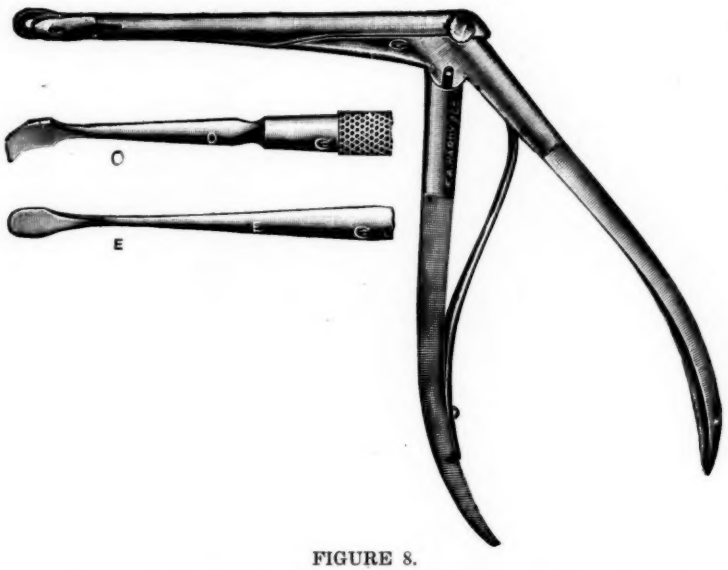


FIGURE 8.

E, Roundbladed knife, for splitting periosteum along top of ridge; O, Raspatory, for denuding ridge; reinforced Freer-Gruenwald forceps.

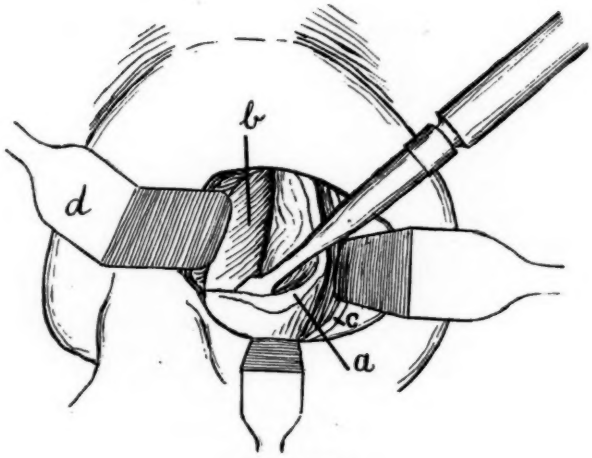


FIGURE 9.

The left nostril held open with retractors; the entire bony deflection including the ridge, a, has been bared of its covering by the raspatory, which may be seen working towards the nasal floor on the concave side of the deflection; b, Mucous membrane of the opposite nostril uncovered by the removal of the cartilage and uplifted from the bony deflection; c, Cut edge of the uplifted covering of the posterior part of the deflection held away with a long retractor; d, Retractor holding forward the anterior (reversed L) flap.

XXXVI.

SOME LABORATORY AIDS TO OTOLOGIC DIAGNOSIS.*

By Frederick E. Sondern, M. D.,

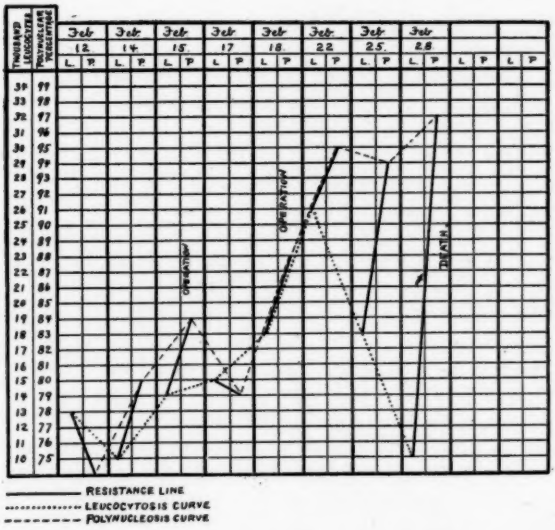
New York.

The usefulness of the differential leucocyte count as an aid in the diagnosis of inflammatory lesions, the added significance it gives to the leucocyte count itself and the value of the ratio existing between the two, as originally described in the *Medical Record,* March 25, 1895, have been accepted as important aids by the physician as well as the surgeon, to which the many articles in current medical literature bear testimony. Their application in acute middle ear disease and its complications was the subject of my communication read before the Otological Section of the New York Academy of Medicine three years ago (*Archives of Otology,* 36, 1), and continued contact with cases in which this diagnostic and prognostic aid is sought has strengthened my belief in its value. It is obviously difficult for the laboratory worker to present substantiating clinical reports, nor is this necessary at present, owing to the large number which have been published by surgeons of both continents. When dissatisfaction with the method has been expressed it can usually be traced to a disregard of the limitations and exceptions from which no laboratory procedure is immune. Accurate technic is absolutely necessary, and while simple, is not universally practiced by any means. Inflammatory lesions confined to cellular bone structures do not show as high leucocytosis or relative polynucleosis as noted when soft parts are involved, but the disproportion between the two is present, as shown by the resistance line, in the majority of cases, and, after all, this constitutes the important feature. The claim that pus was found with slight polynucleosis and

*Read at meeting of American Laryngological, Rhinological and Otological Society, Washington, April, 1910.

none with marked polynucleosis, or that the leucocyte count was low in severe cases and high in slight ones, demonstrates that the most valuable feature of the method has been overlooked, namely, the relation between leucocytosis and polynucleosis, or the resistance line. It has also been stated on several occasions that lesions confined to bone show no blood change. This is contrary to the experience of most observers. As previously stated, purulent inflammations in cellular bone structures, as a rule, show lower figures than processes of similar severity in soft parts, though not necessarily so. Suppurative processes on the surface of mucous membranes, pyogenic infections mixed with tuberculosis, typhoid fever or measles, or following these diseases show relatively low figures. When purulent exudates are confined in dense pyogenic membrane and toxic absorption is prevented, or when they are the result of organisms which do not produce leucocytosis or relative polynucleosis, the absence of these changes is explained. The exact bacterial nature of the infection also has a bearing on the degree of leucocytosis and relative polynucleosis. With the exercise of every precaution, a relatively very small number of cases is met with in which the examination does not reflect the true condition. These are usually patients with much reduced vitality, and it seems reasonable to look to one of two causes for an explanation. Either the vitality is so low that absorption of toxin no longer takes place or on account of improper circulation the drop of blood taken from the finger or ear does not represent the actual condition of the blood as a whole. It is probable that the same reason explains why the method does not work out as well in infants and young children, particularly in those in whom the prostration is extreme. After the leucocyte count and polynuclear percentage have been determined the resistance line should be drawn, as shown on the accompanying chart, which is an improvement suggested by Wilson of Rochester, Minn. (*Northwestern Lancet*, July 1, 1901), on the chart as originally proposed by Gibson, by showing successive examinations as in a temperature chart instead of on top of one another. It goes without saying that repeated examinations are essential if the desired information is to be obtained. A horizontal or falling resistance line means good leucocytosis and relatively moderate polynucleosis, the higher in the scale the greater the

severity, but in any event well borne by the patient with comparatively good prognosis. An ascending resistance line means insufficient leucocytosis and relatively pronounced polynucleosis, the longer the line and the higher in the scale the greater the severity, the poorer the resistance and the poorer the prognosis. The dotted line shows the leucocyte curve, while the dashed line shows the polynuclear percentage curve. A brief description of the case plotted, a mastoiditis followed by sinus thrombosis and general sepsis, will illustrate the usefulness



of the chart. The first examination shows 13,000 leucocytes and 74% polynuclear cells, or a descending resistance line low in the scale, indicating mild infection and good resistance. Second examination: 13,000 leucocytes and 80% polynuclear cells, or an ascending resistance line higher in the scale. Neither the leucocyte count nor the polynuclear percentage is high, but the resistance line indicates more marked infection and loss of resistance, which, in view of the clinical history, justifies the suspicion of the presence of a purulent exudate. Third examination shows the same, somewhat higher in the scale. Fourth examination shows some improvement. All

subsequent examinations show increasing infection and decreasing resistance to the end. Drawing the resistance line on a chart as illustrated is to be recommended when blood examinations are made as a routine procedure, as it enhances the value of the determinations.

Iodophilia as an indicator of the presence and severity of an inflammatory process was warmly recommended by Locke (*Boston Medical and Surgical Journal*, 1902) some eight years ago, and while the method still has a few advocates it has been abandoned by the majority in favor of the leucocyte and differential count ratio.

The Arneth nuclear count has as its object the determination of the phagocytic power of the blood, on the basis that the older polynuclear cells are the true phagocytes. In a recent article by Dluski and Rospedzihowski (*Beitr. z. Klinik d. Tuberk.*, XLV. No. 3), this is modified by the statement that the older polynuclear cells are the antitoxin bearers or producers. The degree to which these older cells are destroyed by the action of the infection is believed to be characteristic of the severity of the affection and of the resisting power of the patient. Several years ago I had a long series of observations tabulated (Smith and Lansing, *Bull. Lying-In Hosp.*, March, 1908), which failed to bear out this claim. Milligan read a paper before the Otological Section of the New York Academy of Medicine some time ago, which I have not been able to find in print, in which he advocates the use of the method, particularly in infants, to get an index of the resistance as well as of the severity of the infection. Though faithfully tried, I regret that I was not able to demonstrate the value of the method for this purpose.

The introduction of comparatively simple apparatus for sufficiently accurate determination of the viscosity of the blood by Hess and others promises an additional clinical laboratory help in diagnosis. W. Müller (*Centralbl. f. Chir.*, Oct. 9, 1909) recites the results of his investigations in surgical affections. The viscosity normally increases during the first day after operation. It then declines to normal in three days, is subnormal for two days and then returns to the normal. It is abnormally high in acute inflammatory lesions, and sudden decline indicates exhaustion. Any focus of inflammation causes increased viscosity of the blood and rapid and regular

postoperative decline indicates freedom from complications. Rubino (*Policlinico*, Aug. 29, 1909) claims that the change in viscosity of the blood is one of the first signs of cardiac insufficiency. A far greater amount of investigation will be necessary before the method can become of practical use to the clinician.

The examination of aural discharges should include a bacteriologic and cytologic investigation. While it is not within my province to urge the clinical necessity for this information, there is no doubt that this laboratory factor is a valuable adjunct to diagnosis and prognosis, as the published records of Suepfle, Witmaack, Libman and numerous others quoted by the latter indicate. The bacterial examination can be made in two ways, by means of stained smears of the discharge and by culture on suitable media. The examination of properly prepared stained smears is of considerable diagnostic value, but there is not only occasional difficulty in determining the identity of the organism found solely on its morphologic features and staining quality, but these may at times be directly misleading.

The differential staining methods as proposed by Buerger (*Journ. Infect. Dis.*, June, 1907) are certainly a great help, but they unfortunately make it necessary for the microscopist to be present when the specimen is obtained, if the method is to be applied directly to the aural discharge, a difficulty more easily overcome in hospital than in private practice. Rulison (*Journ. A. M. A.*, April 30, 1910) has just described a much more simple method of staining capsules, which promises equally good results. The use of these methods will demonstrate how crude the ordinary procedures usually employed are, and in consequence the results of the latter must be taken for what they are worth. Some workers go so far as to refuse to interpret information from any single smear, though this would seem ultra-conservative. Cultures from aural discharge certainly allow a more accurate determination of the bacterial content, provided the medium be properly selected and the organism grows on it. As there are a number of organisms found in aural discharge which it is difficult or impossible to demonstrate quickly on culture, such as tubercle bacilli, gonococci, Vincent's spirillum and others, it is advisable to use both methods. Direct staining for immediate infor-

mation and culture for corroboration and to have material for vaccine if this therapy should be decided on. A very complete enumeration of the organisms met with, particularly in cases of chronic otitis media, can be found in an article by Wingrave in the *Medical Press* of London, 1908.

The cytologic study of aural discharges has had comparatively little attention, if journal articles are a proper indication. As applied to transudates and exudates other than those from the ear, it has proved to be of value in diagnosis, and therefore an investigation of the subject is justified, particularly in chronic discharge. Wingrave in the article quoted also calls attention to the benefit derived from cytologic studies. Several years ago I made cyto counts in quite a number of specimens of aural discharge received for examination, with the hope that an interest might be created. The number is not sufficient to justify conclusions, but in a general way it may be said that an acute otitis media shows a pronounced predominance of polynuclear cells. In the cases which promptly get well the count soon changes to about equal percentages of lymphocytes and polynuclear cells, while the cases which do not do so well, and particularly those in which mastoid involvement follows, continue to show a high polynuclear percentage for some time. The nature of the organism also has an influence on the figures. The smears used to determine the organism can also be used for obtaining the cyto count.

The blood culture is of particular diagnostic value in the complication of otitis media, owing to the frequency and significance of bacteremia. The researches of Libman (*Amer. Journ. Med. Sciences,* September, 1909), in the otologic service of Gruening at the Mt. Sinai Hospital, are particularly praiseworthy on account of the accurate technic employed, not only in the culture, but also in the identification of the organisms obtained. A critical study of the opinions voiced by different observers as well as personal experience in reference to the invariable absence of a bacteremia in cases of otitis media with mastoid involvement and without sinus thrombosis, would indicate that this is still an open question and by no means settled, as Libman would have us believe. Cases are now and again met with in which a bacteremia is demonstrated, not only in one, but in several cultures, and where there

are no evidences of sinus thrombosis, though these are certainly exceptional instances. It is beyond the scope of this communication to enter into a consideration of the value of both negative and positive findings, nor can those tabulated by Libman in his last paper on the subject be improved upon.

Vaccine therapy rests, according to Wright, on the basis that the opsonic value of the blood is reduced and can be brought to normal or above by the injection of the bacterial vaccine. This stimulates the formation of antibody only if the cells are in condition to react. In active systemic infections the opsonic value of the blood is high and does not need increasing, and the cells are exhausted and consequently cannot be stimulated to produce more antibody. It is on this ground that the use of vaccines is not advised in acute systemic infections; if, however, they are found useful in these cases, it will be necessary to modify the views concerning their mode of action. If the present theory is correct, an ascending resistance line found on blood examination, and particularly the demonstration of a bacteremia, should contraindicate the use of vaccines. Personal experience, as well as the opinions of Thomas (*Journ. A. M. A.*, Oct. 12, 1907), Potter (*Journ. A. M. A.*, 49, 1815), Saathoff (*Münch. med. Woch.*, 55, 779) and many others indicate that the opsonic index determination is inconstant and impracticable and not to be recommended as a diagnostic procedure. Horder's description of the reasons for this in the *St. Bartholomew's Hosp. Journal* is interesting.

The information obtained from the urine concerning evidences indicating the presence of nephritis or diabetes, as well as intestinal toxemia, acidosis or other forms of faulty metabolism, is of interest to the otologist, as it has a bearing sometimes on the diagnosis and more often on the prognosis of the ear lesion. Careful analysis of the urine prior to anesthesia is frequently a safeguard against disagreeable surprises afterward.

In closing, allow me to say that the most ardent advocates of laboratory aids, if they have clinical experience, have never intentionally conveyed the idea that these methods are intended to take the place of clinical observation. The most acute bedside observer is usually the one who also obtains most help from laboratory procedures, as he is well versed in the value of this information. When interpreting the significance of

laboratory findings, no matter how characteristic these may seem, it is imperative to recall all the causes which may occasion this change, and disregard of a single one is the most potent factor in erroneous conclusions. Laboratory methods of diagnosis are aids only, and are not intended to replace diagnostic skill or prognostic ability based on clinical experience

XXXVII.

QUININÆ AND UREA HYDROCHLORATE (SYN. QUININÆ-CARBAMIDUM, UREA-QUININE) AS A LOCAL ANESTHETIC.*

By E. Fletcher Ingals, M. D.,

Chicago.

In the *Journal of the American Medical Association,* October 23, 1909, there appeared a short article by Drs. A. E. Hertzler, R. B. Brewster and F. B. Rogers on the use of quinine and urea hydrochlorate as a local anesthetic. They referred to an article by Dr. Thiebault, 1907, who recommended a 1% solution for local injection and from 10 to 20% for local application to the mucous membranes. They also referred to an article by E. J. Brown, *Journal American Medical Association,* August, 1908. He recommended this drug in tonsillectomy and adenectomy. Thiebault found that after the injection of a 1% solution perfect anesthesia was obtained that lasted four or five hours. The authors of the more recent article, as a result of their clinical and experimental use of this drug, confirmed the former reports, and Hertzler claims that after injection of ½ to 1% solutions immediate and perfect anesthesia occurs and lasts for four or five days, and that complete restoration of sensation may be delayed for from ten to fourteen days. They found this drug an efficient and safe local anesthetic when injected in solutions of from ¼ to 1% in water; but the 1% solution caused undue fibrinous exudation with induration that appeared to interfere with primary union in some instances; yet, in other cases this was an advantage by tending to check hemorrhage. They suggest a solution of from 10 to 20% in strength as an anesthetic when applied to the surface of the mucous membrane. One hundred grains of this drug were injected into the veins by Brewster in the

*Presented to the American Laryngological Association, Washington, May, 1910.

course of six hours, in a case of pernicious malaria, with recovery of the patient.

For a long time I have been searching for an agent that would produce prolonged anesthesia of the mucous membranes, for the relief of hay fever and hyperesthetic rhinitis, therefore I grasped eagerly at this and began at once using it in my ordinary operative procedures in the nose; but owing to the season of the year, I had no opportunity to try it carefully in either of these extremely sensitive conditions. At first I tried a 20% solution of the quininæ and urea hydrochlorate in water as a local anesthetic for the nasal mucous membrane. I found that this solution was too concentrated for satisfactory use, as it crystallized when the water became cool; but it produced complete anesthesia, though it required about four times as long to obtain this result as with the 20% solution of cocain in 1 to 1000 of suprarenalin. At first, after the anesthesia had been obtained, I applied the suprarenalin solution 1 to 1000 to prevent bleeding, but the results were not satisfactory. I did not use the two together, fearing that the suprarenalin would interfere with absorption of the anesthetic. I then tried combining the quininæ-urea hydrochlorate in solution with the suprarenalin and found that although slow in action it caused perfect anesthesia and prevented bleeding. Desiring more rapid action, I next combined 15% of the urea-quinine with 5% of cocain hydrochlorate in a solution of 1 to 2000 of suprarenalin. This produced anesthesia as quickly and sometimes apparently more quickly than a 20% solution of cocain in 1 to 1000 of suprarenalin, and the anesthesia was more prolonged. However, I have not been able to determine the duration of the anesthesia. This solution turns to a brownish color after a few hours, but it seems to work about as well as when first made up, excepting that the activity of the suprarenalin appears to be somewhat diminished. It would probably be better to combine the solutions just as they are to be used, but the other plan works so well that I have continued to use it to avoid the trouble of preparing the solution each time.

From my experience in many cases of deep cauterization of the turbinated bodies in which I have used this anesthetic on the mucous membrane, I have the impression that considerable anesthesia lasts for hours, but I have not obtained such

prolonged anesthesia as reported by Hertzler, who used it hypodermically.

In the treatment of intumescent or hypertrophic rhinitis, I have used this anesthetic many times before making long, deep linear cauterizations across the inferior turbinated body, and have had profound anesthesia in every case. After cauterizations of this sort, where cocain or cocain and suprarenalin have been used as an anesthetic, the reaction is generally so great that when the patient returns at the end of four days after the cauterization the affected naris is much obstructed by a mass of inflammatory lymph about 4 c. m. long, about 1½ c. m. wide and from 2 to 4 m. m. in thickness. This renders it necessary to pass a probe between the turbinated body and the septum to prevent adhesions; but after using this new anesthetic with the same sort of cauterization there has been much less reaction, and we have seldom seen more than from 25 to 50 per cent as much of this inflammatory lymph. This fact seems to indicate that the new anesthetic minimizes the reaction.

I have used this same solution in the larynx, trachea and bronchi in connection with ether anesthesia, in six bronchoscopies in children, for the removal of foreign bodies from the lungs, without any unpleasant results, and I have not hesitated to use it freely. In one of these patients, fearing the necessity of a tracheotomy, I first anesthetized the region over the trachea with a few drops of the same solution diluted 30 times with distilled water, but as tracheotomy did not become necessary I could not judge accurately of the extent of the anesthesia; however, the hypodermic use of the anesthetic did not affect the little patient unpleasantly.

I have used the same solution, diluted about 15 times, submucously in connection with topical applications in the nares in three or four cases. In one of these, where a painful operation on the posterior ethmoid cells was done, it gave excellent results, and in the others the anesthesia appeared to be more complete than could be obtained by applications to the surface alone.

I have used this anesthetic for turbinectomies, for the removal of polypi and in several operations for removal of spurs or ridges from the septum or for submucous resection, with great satisfaction. In all of these cases it appears to me to

have acted much better than a 20% solution of cocain in 1 to 1000 of suprarenalin solution.

In one instance, where I used it submucously to relieve nasal neuralgia, the patient suffered for several hours afterward from pain, and from her report there appeared to have been much swelling of the nasal mucous membrane. I had one patient with hyperesthetic rhinitis, to whom I gave a 10% solution of quinine and urea hydrochlorate,[1] but she complained that it smarted so badly that she was unable to use it; but I have tried it in fairly healthy nares in solution in distilled water, and in Dobell's solution, and found that a 10% solution could be borne by very sensitive persons and a 15% solution in ordinary cases.

I have tried this drug in the nares triturated thoroughly with sugar of milk up to a strength of 5%, which appeared as much as could be easily borne by the ordinary person; 4% seemed as strong as could be used comfortably by those with very sensitive mucous membranes.[2]

This is a very valuable local anesthetic; but my experience does not lead me to anticipate very much benefit from its use in either hyperesthetic rhinitis or hay fever. However, in view of the claims that have been made for it in producing prolonged anesthesia, and in view of the old treatment of hay fever by nasal applications of a solution of quinine, I think it well worth while to give it a fair trial in these affections.

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1. My subsequent experience leads me to believe that there was no ground for this complaint.

2. I have since used ten per cent of this drug in powdered sugar of milk in persons with very sensitive nares, without any inconvenience, and I would advise trying this strength in hay fever.

XXXVIII.

THE MANIFESTATIONS OF RECURRENT INFLUENZA IN THE NOSE AND THROAT.

By Joseph L. Goodale, M. D.,

Boston.

The object of the following paper is to call your attention to a class of cases characterized by annual recurrence of influenza or influenza-like attacks, which exhibit certain definite clinical phenomena.

At the outset it should be said that the term influenza is necessarily used with a certain latitude. F. T. Lord[1] reports an epidemic of influenza taking place in Boston in 1907 and 1908, from which he comes to the conclusion that until the etiology of the disease is finally determined it seems best to continue the use of the term influenza to designate a complex of symptoms without regard to the apparent bacterial cause. The same writer[2] studied the bacteriologic findings occurring in interepidemic cases, finding the influenza bacillus in practically pure culture in 25% of the cases, and the same organism mixed with other bacteria in 59%. He concludes that the etiologic unit appears to be lacking in the epidemic cases, not only as regards the influenza bacillus, but also for other organisms, since no one group of bacteria could be demonstrated as a constant invader in the specimens. In the absence of other discoverable causes, he comes to the conclusion that various organisms, as influenza bacillus, the pneumococcus, the micrococcus catarrhalis, the pyogenic cocci, and others, singly or combined, are responsible not only for the interepidemic, but also for these epidemic cases with the clinical picture of influenza.

In an examination of cases by William H. Park,[3] in 1905, of an epidemic in New York City, it was shown that pneumococci and streptococci were usually present, in association with influenza bacilli. These occurred in normal individuals, as

well as those suffering from colds, grippe and bronchitis. It seemed reasonable to assume that with an inflammation of the mucous membrane, these microorganisms increase in number and virulence. Park came to the conclusion that under ordinary circumstances, a variety of microorganisms exist, which, under ordinary circumstances, are innocuous, but which become virulent when the natural resistance of the tissues is lowered by a cold. It is also probable that the same microorganism may exhibit an increase of virulence during an infection, and that the same bacterium when transported to another throat is then better prepared to excite the disease than the organisms already existing in the individual. During an epidemic the virulence is so increased by frequent transplantations that in a certain number of individuals the simple deposition of the bacterium upon the mucous membrane is able to excite the disease. He comes to the conclusion that the bacteriologic examination in these cases is more of scientific than of practical interest.

In routine work, therefore, where bacteriologic examinations are not made, we may be justified in making our diagnosis of influenza by the clinical phenomena. These enable us to say with a fair degree of accuracy how far the bacilli of influenza may be an etiologic factor in the production of the symptoms-complex. Among the multifarious types of acute inflammation of the upper air passages, certain salient features are conspicuously characteristic of the different pathogenic microorganisms. Thus, with the staphylococcus pyogenes, we expect pus formation; with the streptococcus, a more intense inflammation and production of fibrin; with the pneumococcus and the diphtheria bacillus, a fibrin formation, each microorganism having also a more or less well-marked clinical picture. In the differentiation of these affections, the following arrangement is helpful from the standpoint of etiology: First, I am accustomed to exclude influenza in those acute inflammations of the upper air passages, invading primarily the columnar, ciliated mucous membrane of the nose, larynx and trachea, in which the element of trauma plays a considerable part. We may thus find conditions to arise from exposure to dust, irritating vapors and excessive use of the voice, also from exposure of the throat to cold winds, to which it has not been previously accustomed, as in the case of an

individual, normally a nose-breather, suddenly obliged to breathe through the mouth, and to face a cold wind, laden with dust. Under such circumstances, an attack of primary laryngitis or tracheitis is to be expected. Within the last few years, this type of case, since the advent of motoring, has become especially frequent. To my mind, these cases are primarily traumatic and only secondarily infectious inflammations, and are to be treated locally from this point of view, the object being chiefly to provide rest for the part and a protective covering.

Second, I exclude influenza in conditions where the inflammation originates in the lymphoid tissue of the fauces and completes its history in these situations. These conditions are primarily infectious rather than traumatic, and comprise the various forms of acute inflammation of the faucial, pharyngeal and lingual tonsils. In these cases the inflammation does not extend to the neighboring regions beyond a slight degree. The pathogenic microorganisms are chiefly the streptococcus, staphylococcus and pneumococcus. (Diphtheria is omitted from consideration.)

The influenza group of inflammations of the upper air passages is characterized in its typical form by the following phenomena: Pathologically the ordinary inflammatory alterations are seen to be marked by a predominance of epithelial desquamation and by submucous edema. Clinically we find sudden onset, fever, prostration, accompanied or followed by marked depression of spirits.

Such is the picture usually presented by the individual experiencing his first attack of influenza. With the recurrence of the inflammation in successive years, however, a certain relative tolerance to the toxin appears to be acquired by the system. We find, under these circumstances, the same sudden onset, but symptoms throughout of less intensity, at times difficult to distinguish from ordinary traumatic colds. A distinguishing feature is, however, the remarkable persistence of purulent discharge from the affected regions, whether sinuses, trachea or bronchi, their slow tendency to recovery, and the elevations of temperature excited by physical exertion.

In the past few years my attention has been especially attracted by a group of cases exhibiting a well-defined symptom-complex, and it is to this that I wish to call your attention.

Briefly, these cases are characterized by a primary involvement of lymphoid tissue in the pharynx or nasopharynx, and an immediate extension of the inflammatory phenomena to the mucous membrane of the sinuses, trachea and bronchi, with simultaneous subsidence of the inflammation in the lymphoid tissue. Examining these patients now in more detail, we find a past history of annual attacks of inflammation, the earlier ones intense and prostrating, but becoming progressively milder. In the present illness, examination of the throat at the onset shows reddening and swelling of one or more pharyngeal granules or of the tonsils, accompanied by moderate pain or at times only a slight burning sensation on swallowing. It is important to note that this involvement of the lymphoid tissue precedes any disturbance of the nose or lower air passages. It is always transitory, but its disappearance is immediately followed by inflammation of the sinuses and of the trachea or bronchial tubes. A characteristic occurrence is acute inflammation of the ethmoid sinuses on one side, and of a definite region in the bronchi, on the corresponding side. Purulent discharge appears in the nose, and simultaneously cough with purulent expectoration. In these cases I have found the ethmoid more frequently affected than any other sinus. It is to be noted that if deviation of the ethmoid plate of the septum exists, it is the middle turbinate region opposite the concavity which is more frequently involved than its fellow on the opposite side. Examination of the chest shows a bronchitis limited to a small, well-defined region. At times physical signs in the chest may be wanting, but the patient complains of a sensation of pain or lameness on one side. These conditions last for several weeks. The cough is severe and out of proportion to the amount of expectoration. There is manifestly a nervous element in its causation. It is often referred to a particular spot in the pharynx, which shifts its seat from day to day, moving from one pharyngeal granule to another.

While sometimes considerable loss of strength, color and flesh accompany these manifestations, yet often the patient shows only a moderate depreciation of vitality, being troubled chiefly by the profuse purulent discharge from the sinuses and bronchi. As these symptoms usually last for several weeks, the question of tuberculosis is apt to be raised in the mind, both

of the patient and his physician. In addition to the absence of tubercle bacilli in the sputum, the most reassuring element is the history of previous similar attacks. It is, in fact, so regular an affection that patients at the very onset of a pharyngeal pain have predicted to me with accuracy the subsequent course of the disease.

In view of the regular involvement of a given sinus and of a definite bronchial area, the question suggests itself, What is the pathologic condition existing between attacks in these regions which predisposes them to invasion? In the nose, this query is perhaps sufficiently answered by the demonstration of chronic hypertrophy or actual polypoid degeneration of the mucous membrane of the affected middle turbinate. In the bronchi, we have, so far as I know, no direct evidence from postmortem findings. Whether a condition of bronchiectasis or hypertrophy of the bronchial mucous membrane exists, either singly or in association, remains to be determined. It would seem probable, however, that a condition is present in a well-defined bronchial area analogous to that which can be observed in the ethmoid sinuses.

With regard to treatment, I may first say that out of twenty cases observed in the past few years I do not remember to have been able to abort the attack in a single instance. When once the lymphoid elements in the pharynx have become inflamed the local application of guaiacum or of the silver salts have only doubtfully shortened the pharyngeal symptoms, but the sinus and bronchial inflammation has succeeded with regularity and apparently uninfluenced. The measures of chief importance have seemed to me to be a change of air during the attack and an obliteration, as far as possible, of the lymphoid elements in the pharynx during the intervals.

With reference to a change of air in these cases, it has seemed to me, in the early stage, while the symptoms are increasing in intensity, that transition to a colder, drier and higher region was more productive of harm than good. The symptoms appeared, under these circumstances, to be increased in intensity, the cough was made worse and the fever prolonged. I have come, therefore, to regard perfect rest at home as the best plan to pursue in the first half of the affection. After the inflammation has passed the acute stage and the fever has subsided, it has seemed to me that a change in

the winter months to a warm, moist atmosphere gave little improvement. Such places are Charleston and the whole coast from South Carolina to Palm Beach. The air in these regions during the winter is laden with moisture, and patients have expressed themselves to me after their return as having experienced little or no improvement. On the other hand, the interior of Florida, the sandy regions in South Carolina and Georgia, away from the coast, during the winter months, often manifest a prompt influence upon the nasal and bronchial secretion. A stay of at least two weeks is necessary before the patient can be safely trusted to return home. I have frequently observed, where the time has been limited and the patient obliged to return North after a short stay on the Florida east coast, with perhaps no improvement in the amount of nasal discharge and expectoration, that the return under these circumstances to the more stimulating Northern air, is followed by immediate improvement. Patients may be sent North, however, during the winter if the acute symptoms have entirely subsided, and if time is limited, are more likely under these circumstances to experience benefit than if they attempted to go to a warmer climate.

The matter of change of climate may thus be briefly summarized: In the early stage of this type of influenza of the nose and throat entire rest at home is to be advised. With the subsidence of the febrile symptoms, if time permits, a change to the South, away from the seacoast, is to be recommended, but if a patient has a week or less at his disposal he may be recommended to go to a higher, drier region farther North.

With reference to treatment of the persistent cough, after the subsidence of the acute stage, I have found little benefit from sedatives, but a marked improvement to occur from superficial cauterization of the granules in the pharynx. The patient is often able to point with exactness to a single granule as the source of the uncontrollable tickling, and this may be touched with crude carbolic acid with immediate relief. It often happens, however, that on the following day a granule in the vicinity, or on the other side, is complained of and requires cauterization. The carbolic acid should be applied carefully to the granule and not to the mucous membrane in the vicinity.

A consideration of these cases renders it probable that the

infecting agent enters the mucous membranes through the lymphoid tissue of the pharyngeal follicles, or of the tonsils, or of the adenoid, and the preventive treatment of this condition has therefore suggested itself to me. On theoretical grounds we should expect, if the mucous membrane of the pharynx were deprived of its crater-like granules and the tonsils made more resistant, that the individual would be able to receive with greater impunity in the mouth the successive volleys of virulent microorganisms, which he continually has to face during the winter. If it be true, as suggested by Park, that our attacks of influenza are due to the progressive heightening of the virulence of the organism with each transfer, it would seem reasonable to assume that many attacks may be escaped if the individual does not possess loopholes in his most exposed regions, through which the organisms may penetrate. I have, therefore, been carrying out systematically, during the past few years, the obliteration of the pharyngeal follicles, so far as practicable, by strong solutions of silver nitrate. At the same time I have introduced solutions of silver nitrate into the tonsillar crypts where possible or brushed this reagent over the surface of the tonsil. Where the individual has complained of his nasopharynx as being the primary source of the infection, special attention is given to this region by painting its surface with a weaker solution of the silve nitrate.

The claim of preventing a disease by treatment is not willingly made by any of us, where our etiologic and pathologic knowledge is as meager as in the present subject. Yet since we are struggling to advance our control over disease, it seems to me that we should not be deterred from presenting to the consideration of our fellows any ideas, however insufficiently established, which have been helpful to ourselves or which carry a promise of assistance to our patients.

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XXXIX.

LARYNGITIS DOLOROSA.

By Wolff Freudenthal, M. D.,

New York.

The title adopted for this paper is not intended to indicate that a new disease is to be discussed, but is rather to be taken as a symptomatic designation for many affections that may well be grouped under the same head.

Since Guyon applied the term of cystitis dolorosa to a variety of bladder troubles, such as ulcers, neoplasms, stones, etc., all of which have the one symptom in common, viz.: attacks of severe pain, it seemed to me proper to give the name laryngitis dolorosa to all those affections of the larynx in which pain is the most prominent feature. As that symptom is of so great importance, not only with reference to the comfort, but also the life of the patient, and as its treatment can be considered from one common viewpoint, the writer has taken the liberty of bringing this theme before this body of experienced men, hoping thus to contribute to some extent to the management of some of the most obstinate cases met with in practice. Diverse as is the general treatment of such diseases as lues, tuberculosis, etc., the symptomatic therapy of the larynx in all these cases will be very much the same.

Since pain is the only symptom which we are considering, and this occurs most often and severely in ulcerative processes of the larynx, we shall confine our remarks to

(a) Tuberculous ulcers;
(b) Syphilitic ulcers;
(c) Carcinomatous ulcers;
(d) Diabetic ulcers.

It may be said that since the writer in 1899 described the occurrence of diabetic ulcerations in the larynx,[1] little has been published on this subject. Certainly such cases are rare; but

when they do occur and are recognized, their treatment is very gratifying. But although ulcerations of the larynx, whatever their origin, may be treated on similar lines, locally, in order to relieve the pain, yet there seems to be a difference in regard to certain applications, of which we shall speak later.

The local treatment of these cases should be divided into two forms—the intralaryngeal and the extralaryngeal.

Whatever treatment be adopted in the disease, which will occupy most of our time, viz., tuberculosis, three requirements have to be fulfilled: (1) To stop the cough, which originates in or near the larynx; (2) to remove the dysphagia; and (3) to seek to effect a cure by local applications.

If one sees a patient with infiltrations in the larynx there is little to be done—in fact, it is best not to resort to any treatment whatsoever. About a year ago Sir Felix Semon published an article in the *Berliner klinische Wochenschrift,* recommending laryngeal rest as the main factor in the management of such cases. Long before that time the writer had advocated such a procedure, and had sent many patients to the West and Southwest of the United States, where an enforced rest of the larynx was secured. These patients were not able to talk for days and weeks at a time, for the simple reason that they had no one with whom to converse. At the Bedford Station Sanatorium a similar mode of treatment is followed; that is, the patients are ordered to keep silent, to avoid irritants, such as smoke, dust, tobacco, etc., and a number of them recover.

If, however, these infiltrations break down and ulcers appear, then the pain often sets in, and the method of treatment is much more difficult. For years we have applied lactic acid in these cases. Working under Krause when he first tried it, the writer was the next to make use of it, and did so for at least fifteen years, simply for want of something better. It has now been discarded entirely by me, and the only time it may be effectively used is after a thorough curettage.

A new astringent has lately been introduced, under the name of omorol (Heyden). This is an albuminate of silver which appears to have a distinct penetrating action. It is not soluble in water and must be employed as a powder. In some cases it seems to be very efficacious. The writer has used it in some ulcerations of the larynx with quite satisfactory results.

If a deeper caustic effect is desired, it is best to use the galvanocautery point, as proposed by my friend, Ludwig Grünwald, of Munich. Siebenmann, of Basel, also advises treatment with the galvanocautery, having tried it in 66 cases. The writer employs the galvanocautery occasionally, and is inclined to recommend it for certain cases, but at the same time would caution against severe cauterizing at one sitting. It has been claimed that edema of the larynx does not follow this treatment. This, however, occurred in one of my cases. The patient, a rather strong man, desired to get through as quickly as possible, and was cauterized quite extensively in the larynx. The following night he developed a very unpleasant edema, which, fortunately, subsided the next day, the patient feeling much improved. Perhaps the writer himself was responsible for this accident, which might have been avoided by more conservative treatment.

A more important point than the application of caustics is to remove the hyperalgesia of the larynx by drugs, thus enabling the patients to take solid as well as fluid foods. In former years there was nothing at our disposal with which to accomplish this except cocain. I hope no one at the present time will resort to it, since we have better drugs for this purpose.

The first of the new preparations for producing prolonged analgesia was orthoform. What has been reported by me about orthoform on many occasions holds good to-day. It is an excellent analgesic drug, if you can reach the ulcerated parts with it. Perhaps some have used the emulsion which bears the writer's name. But orthoform has its disadvantages. If applied to the skin, it often produces a very unpleasant dermatitis. The writer had a case in his own family in which a salve containing orthoform had, without his knowledge, been applied to the skin, the patient developing a dermatitis over the entire body.

The drug next to be recommended was anesthesin. It proved indeed a very valuable addition to our pharmacopeia, and the writer used it frequently. But a case of poisoning resulted after administration of a 3-grain powder of this drug. The experiment was twice repeated with one-half the dose, and each time the patient developed cyanosis of the lips, face, fingers, etc. Whether in this instance it was a mere idiosyncrasy it is impossible to say, but it made me cautious.

Finally Dr. Stürmer and Dr. Lüders, of Hamburg, published in the *Deut. Med. Woch.*, No. 53, 1908, their experiments with another drug, which they called propæsin. They had started out to discover a product that would have all the good qualities of anesthesin and orthoform in a higher degree, without any of their deleterious effects. Apparently they found it in propæsin, which is nontoxic (two grammes have been taken per os without bad results) and produces a much more prolonged analgesic effect than that of either of the others. Thus they found that the powder applied to the conjunctiva of a guinea pig caused an insensibility of the cornea, lasting with orthoform 9 minutes, with anesthesin 21 minutes, and with propæsin 84 minutes.

Chemically orthoform is methylester of metamido-paraoxybenzoic acid; anesthesin is ethylester of paramido-benzoic acid; propæsin is propylester of paramido-benzoic acid. Chemically propæsin is=

$$C_6H_4 < \begin{matrix} N.\ H_2\ (1) \\ COOC_3H_7\ (4). \end{matrix}$$

It is a white crystalline powder, almost tasteless and odorless, soluble in alcohol, ether, etc., but not in water. I use the powder or an emulsion that I have had made. The latter consists of

Propæsin	5.0
Formaldehyde	1.0
Menthol	0.5
Ol. amygdal. dulc	15.0
Gum. acaciæ qu. s	....
Aqu. dest. ad	50.0

I must repeat: What I formerly have said of orthoform and anesthesin holds good to-day. They were great improvements in our armentarium medicorum, but, according to my present knowledge, propæsin is better.

I shall omit any histories, since you will try that drug yourselves.

The same treatment was followed in two cases of syphilitic ulcers of the larynx with good results.

Of late dionin has been applied directly to laryngeal ulcerations, it is claimed with good results, but the writer has had no experience with this drug.

INJECTIONS OF ALCOHOL.

There are many cases in which we cannot reach the diseased part, as for example, in a flattened epiglottis, when the ulcer is located on its lower surface, or often on the posterior wall of the larynx or in the trachea. For such cases a new treatment recommended by Rudolf Hoffmann, of Munich, namely, injection of alcohol, may be used with benefit. Braun and Valentin had injected cocain into the superior laryngeal nerve in order to produce anesthesia for endolaryngeal operations; but Hoffmann[2] was the first to employ alcohol injections for analgesia of long duration ("Daueranalgesie"). The place where the superior laryngeal nerve penetrates the membrana thyrohyoidea can be felt with the finger, from the outside. If the patient be placed on his back and the larynx pushed toward the affected side, the most painful spot can be determined with the finger. Here the needle puncture is made in a direct vertical line to the body, a little more toward the outside. The needle is inserted to a depth of about 1½ cm., feeling meanwhile for the spot where the patient complains of the greatest pain, and here the alcohol is injected. Hoffmann recommends 85 per cent alcohol, and of a temperature of 45° C., equal to about 112° F. The writer has used the same proportion.

After the subsidence of the initial pain, which is sometimes quite severe, another injection is immediately made. Hoffmann advises a strong and somewhat blunt needle, which is preferable, as it avoids the blood vessels and is less liable to break. In making injections with an ordinary hypodermic needle, there is risk of its breaking, and it is a difficult matter, even at present, to extract a needle from the trachea or bronchi of a tuberculous patient. For this reason it is always best to employ a strong needle, and to tell the patient neither to swallow nor to talk until the procedure has been completed.

It is well known that Schlösser was the first to recommend alcohol injections for neuralgia of the face, and many such cases have been cured by him as well as by others. While we do not expect such results, we are quite satisfied if we secure an analgesia lasting from five to ten days. That is all we can expect, and that is indeed a great achievement. Hoffmann himself has found that usually after such injections solid food

was swallowed easily, while it was still unpleasant to drink liquids.

Permit me to present a few of my case histories, the first of which is a most favorable one:

Mr. I. K. R., teacher, aged 43, first consulted me on December 5th, 1909, for severe dysphagia. He was suffering from pulmonary tuberculosis and had had two operations, but at the time of his visit was feeling very badly and was unable to swallow. On examination I found ulcerations on the right aryepiglottic fold on the right arytenoid, and one ulcer a little further down in the trachea. Alcohol was injected, and when the patient returned a week later he told me that while before the operation he could not eat on account of pain, during the past week he had been able to eat well and had had a good appetite. He had remained continuously in the open air, and only the day before had had a slight return of pain. A second injection was made, and the patient went to the country. A week later he returned, having again had slight pain on the same side. After a third injection he again went to the country, and, so far as I know, he has had no recurrence of pain in the past two months. This is the most satisfactory result I have had.

CASE 2 is not so favorable. M. S., male, baker, aged 36; far advanced pulmonary tuberculosis. He complained of severe pain in swallowing, and a scratchy sensation in the throat, resulting in coughing spells. There was an ulcer on the lower surface of the epiglottis, and quite marked edema of the arytenoids, perichondritis, and ankylosis of the cricoarytenoid articulation. Two c. c. of 85 per cent alcohol were injected into the left side November 15th. When I saw him, two weeks later—that is, on November 29th—at the Bedford Station Sanatorium, the perichondritis of the left arytenoid was more marked, but the pain on the left side was gone. However, there was pain on the right side, but no cause for it was found in the larynx. A few days later I was informed that the patient had developed palsy on the right side of the face. When I saw him on December 13th, 1909, the paralysis of the facial nerve was marked, and examination showed that it was due to the condition of the right ear. A mastoid operation was not advisable, on account of the advanced stage of the tuberculosis. However, an injection of alcohol was made on the right

side of the larynx, and, strange to say, the pain on that side almost immediately disappeared, thus proving that analgesia travels along the ramus auricularis nervi vagi from below upward, just as in other cases it transmits painful sensations upward. The pain on the left side, however, returned very soon, and in spite of repeated injections the patient died within the following month of pulmonary and laryngeal tuberculosis.

CASE 3.—Mrs. W. B., aged 39, had caught cold a year before and had been suffering since that time. She was hoarse and had some pain on the left side, which extended to the left ear. On examination an ulcer was found on the left side of the epiglottis, with marked infiltration of the entire left side of the larynx. The first injection of alcohol was made on December 9th, 1909. Immediately after she began coughing, followed by slight vomiting. The cough continued for the following three days, when she again called to see me, telling me that she not only coughed, but had had a constant irritation in the larynx since I made the alcohol injection. On that day, December 12th, the left arytenoid cartilage was much more swollen, as well as the left aryepiglottic ligament. Behind this ligament pus appeared. December 15th the patient reported that there was tickling in the throat, which lasted for a day and then disappeared. She expectorated a thick, yellow mucus having an offensive odor. Laryngeal examination showed that the pus had penetrated the left aryepiglottic fold, being plainly visible now. On December 19th the patient felt much easier, and the abscess had disappeared. While the patient continued to call on me occasionally, she objected to another injection, and on February 15th the same clinical picture was seen as before, viz.: swelling on the left side, which meant pus formation. The question in my mind was whether the abscess had been present before the alcohol injection, or whether it had been artificially produced thereby. As the patient had begun to cough immediately after the injection, it seems probable that pus was present and brought to the surface by the alcohol. At any rate, the patient was relieved. The treatment to be followed in her case will be discussed in the next chapter.

I have treated about ten or twelve other cases, with various results. In most cases, where I succeeded in striking the external branch of the superior laryngeal nerve, there was immediate and marked amelioration of pain, the patient not only

being able to swallow solid and semi-solid food, but also to drink water.

We generally can tell when we have reached the laryngeal nerve by the pain which the patient immediately experiences. The alcohol injection does not cause paralysis of the nerve as in anesthesia, but it produces analgesia which usually lasts from three to eight days, and since there is only analgesia present, no "schluck"-pneumonia has ever been observed.

Interesting in this respect was the case reported above, in which there was on the left side a laryngeal otalgia, that is, a pain in the ear which originated in the larynx, while on the right side there was pain in the larynx of otitic origin, both being ameliorated by the alcohol injections.

THYROTOMY.

We now come to the third method of treating laryngeal conditions of tuberculous origin, by thyrotomy or laryngotomy, a procedure which I recommend as a very important factor in curing certain cases. Laryngotomy is practically a new method of treatment, as I was able to find only a few reports on it in literature. Formerly, whenever there was obstruction in a tuberculous larynx, tracheotomy was performed and the patient left to his fate. In the majority of cases he died soon thereafter.

Generally we laryngologists tried to overcome the laryngeal disorders of tuberculous patients by intralaryngeal procedures, so that we meet in American literature reports by only two authors who have done thyrotomy for the above reasons. The one is a surgeon, Dr. A. G. Gerster, of New York, who operated successfully for a tubercular tumor of the larynx; the other is our colleague, Dr. Otto J. Stein, of Chicago, who has published two successful cases.[3]

Of European writers, V. Uchermann, of Christiania,[4] in an extensive and interesting paper read before the Congress at Budapest, reported but one case of tuberculous stenosis of the larynx operated on by laryngotomy.

The following case induced me to perform tracheotomy and open the larynx:

M. K., aged 35, occupation window cleaner, has suffered from pulmonary tuberculosis for six months; sputum positive for tubercle bacilli. He has complained for about four months

of pain in the throat, dysphagia and increasing hoarseness, as well as aphonia and dyspnea. When I examined him at the Montefiore Home in this city, I found ulcerations of both vocal cords, the movements of which, especially on the left side, were very much limited; the ventricular bands were congested, and there was perichondritis of the arytenoids. There was visible a large subglottic mass, the nature of which could not be determined. This was so large that it caused extreme dyspnea, and the patient begged for operative relief; in fact, it was difficult to see how he could breathe at all with this obstruction. As the pulmonary condition was not far advanced, I decided to remove the entire mass by an external operation.

This operation was performed on October 13, 1909, under local anesthesia with adrenalin and cocain. High tracheotomy was done, the cricoid and thyroid cartilages divided in the middle line, the larynx laid open, and then a large mass removed. The interior of the larynx was curetted strongly, and then cauterized with pure lactic acid. The bleeding was very slight. A tracheotomy tube was inserted and the patient removed to bed in good condition. The temperature was 102° F. for two days, soon returning to normal. The general condition was markedly improved. October 30, 1909, the wound was healed, the breathing normal, no subglottic swelling present; the larynx was congested, but no ulceration was visible, and the cords moved freely. The patient was sent to the Bedford Station Sanatorium, and is now feeling very well.

CASE 2.—L. O., male, aged 42, occupation shirt-maker. Father died of tuberculosis. Present illness began about four years ago. Pain in the neck and throat; almost complete aphonia and also marked dyspnea and dysphagia. The lungs showed advanced tuberculosis. The epiglottis was thickened, whitish and irregular. The left arytenoid presented a mass about the size of a large cherry, which concealed the vocal cord on that side. No ulcer could be seen. As this patient was in the same ward as Case 1, and had watched the good results in that case, he begged for an operation. This was performed under local anesthesia, with cocain and adrenalin, with good results. High tracheotomy was done, after which the larynx was plugged with gauze. An incision was made through the cricoid and thyroid in the median line. After the

larynx was laid open, the left arytenoid was removed and about one drachm of pus evacuated through the wound. Then the left ventricular band was removed, also the right arytenoid and the epiglottis, after which the whole interior of the larynx was curetted and cauterized with pure lactic acid. The wound was closed with chromic gut sutures.

The condition after operation gradually became worse. Food was regurgitated through the tracheotomy tube and probably aspirated. The stitches at the upper angle of the wound ripped out, and the discharge was also expelled through this opening. The patient developed pulmonary edema and died within a few days.

In going over this history we ask ourselves whether or not we were justified in performing such an operation in a case so far advanced. The fact is, however, that we were forced to do tracheotomy, as otherwise the patient would have inevitably succumbed from dyspnea. Tracheotomy done, it seemed only a small matter to go a step further and perform thyrotomy, thus affording the patient the only chance of a cure of the laryngeal lesions. Of course, we had no means of knowing how deep these were, from the usual laryngeal examination. Had we known, we would not have opened the larynx.

The next case we intended to operate on was that of Mrs. W. B. (see Case 3). Here we had a typical, almost ideal, condition for this procedure. The woman was in comparatively good health, the lungs not much affected, the only active process apparently being in the larynx. The pus in her larynx was like an active volcano. It was the only cause of her cough, and apparently acted all the time as a source of infection of other parts. Unfortunately, an operation was refused, and nothing further was heard from the patient.

Case 3.—B. A., aged 25, clerk; has been hoarse since five months; has a cough, and has lost in weight 10 pounds during that time. No night sweats; no tubercle bacilli in the sputum. On examination a somewhat irregular mass was found occupying the largest part of the left ventricular band. The main swelling was in the anterior portion, corresponding to which was an excavation on the right side. That side, however, was apparently normal, with the exception of some injection. The largest portion of the left vocal cord was not visible, on account of the swelling. The condition of his lungs was quite

favorable, only the left apex being found affected. As the man's general condition was good, and in view of the possibility of the larynx being the primary and only active focus of infection, the removal of that focus by thyrotomy was, after due deliberation, considered advisable in the best interest of the patient. This was done January 4, 1910, under cocain-adrenalin anesthesia. After laying open the larynx it was found necessary to remove the left vocal cord and ventricular band in toto. The latter on inspection was seen to be ulcerated. Curetment and application of pure lactic acid were made. The right side of the larynx was not touched, as the pathologic changes were considered secondary to the irritation of the other side. Cessante causa morbus cessat proved to be correct.

The patient had quite high fever after the operation. On the fourth day it reached its maximum with 104.2° F. Then it slowly went down, but it did not subside entirely before January 22, 1910, i. e., 18 days after the operation. From now on his recovery was very quick, the patient being out of bed the greater part of the day.

In summing up our limited experience with this operation, we must say that occasionally such a procedure may be unsuccessfully attempted in a hopeless case as the last resort, but in other instances it will tend to prolong the life of the patient and will open a path towards a final recovery. If we had simply done a tracheotomy in Case 1, the man would still carry his tumor with him, this acting as a source of constant irritation as well as a menace to his life. But even such patients without any tumor, as Case 3, should be operated upon by laryngotomy and all the diseased tissue removed. If the lungs, as in this case, are but slightly affected and the larynx is the chief factor in causing trouble, then only radical surgical intervention will prove of service, and this cannot be accomplished intralaryngeally.

Furthermore, if you make many autopsies on persons with laryngeal tuberculosis, you will find abscesses and their sequelæ oftener than you think. Thus, for example in this specimen, pus was found in the neck, of the presence of which we had no knowledge while the patient was alive. That pus came from the interior of the larynx, having made quite a perforation through the thyroid cartilage. In vivo there was seen

a marked infiltration on that side, with ulcerations. Pus had been noted in the larynx, but naturally it was supposed to have its origin lower down in the lungs. That specimen and the case of Mrs. W. B. convinced me that in tuberculous cases the larynx should be opened up oftener than heretofore, so as to permit of direct inspection. With the present Schleich anesthesia the patients can stand the operation better than under a general anesthetic, and those who have fair resistance power will certainly benefit by it.

The question of thyrotomy in cases of carcinoma of the larynx is an entirely different one, and the writer has nothing to add on that point at present.

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XL.

THE PHYSIOLOGY OF THE COCHLEA. SAMMELREFERAT.*

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Before the work of Cotuguo in 1760 demonstrated that the inner ear is filled with fluid it was generally believed that the labyrinth contained air "implanted" in its cavities "aer ingenitus." This idea originated with Aristotle in the fourth century B. C., who argued that since the ear is the organ for the air sense it is necessary for it to have the same nature. Since hearing takes place from the air there must be air in the head to respond to the outer air. The persistence of the idea that the labyrinth of the ear contained air did not prevent, however, the gradual development of those ideas regarding the physiology of sound perception which form the basis for the present day views. The Greeks, for example, looked upon this "implanted air" as the actual sense organ. The idea of its physiologic importance was very much diminished long before it was demonstrated that the labyrinth contained fluid, and while the necessity for the ear to contain air was still adhered to. Schelhammer, for example, in 1684 contended that since air was a medium for transferring sound it could not be the actual sense organ itself. The inner air in the ear was, according to Schelhammer, the medium, not the organ, for perception. The organ for perception was the nerve of hearing.

A discussion of the present day theories of sound perception begins naturally with a consideration of the work of Helmholtz. The fundamental conceptions of the Helmholtz theory, viz., that tone perception is dependent on the vibration of structures in the cochlea in response to the impulse of sound waves, and that this response takes place in different

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parts of the cochlea for the tones of varying pitch, were conceptions which had found expression, however, long before the time of Helmholtz.

The idea of the existence in the cochlea of a vibrating mechanism which responds to the impulse of sound waves seems to have been first expressed in the writings of Claude Perrault (1680), who held that the fibers which enter the spiral lamina of the cochlea form with the bony substance a sort of membrane which constitutes the actual end organ of hearing, and which is thrown into vibration by the jarring of the air enclosed in the labyrinth.

The idea that there exists in the cochlea a mechanism which responds in its several parts, depending on the pitch of the tone, was first clearly expressed by Duverney (1683).[1] He believed that the lamina spiralis in the cochlea was an actual end organ for sound perception, which he likened to a musical instrument. Its ability to respond to the sound waves for tones of varying pitch was dependent on its varying breadth from one end of the cochlea to the other. Since the broader shelf of the lamina spiralis is found in the basal coil, this is the part that responds to the low tones, while the narrow lamina near the apex of the cochlea responds to the higher tones. The difference between this conception of Duverney and that of Helmholtz is essentially that the latter had a knowledge of the membranous labyrinth which was not known to Duverney.

Helmholtz selected the membranous part of the spiral partition, the membrana basilaris, as the vibrating structure which responds in the several parts of the cochlea to the tones of varying pitch. Because the radiating fibers of the membrana basilaris are shorter in the basal coil, and become gradually longer towards the apex of the cochlea, Helmholtz placed the perception for the high tones in the basal coil and the lower tones near the apex of the cochlea.

Valsalva (1704)[2] came still closer to the Helmholtz conception of the function of the cochlea in that he placed the mechanism for perception not in the osseous lamina spiralis, as did Duverney, but in the "zonæ sonoræ," membranous bands made up of the branching of the nerve of hearing, which varied in length like the strings of a musical instrument. Their difference in length determined the vibration of the different

bands for tones of different pitch. He also pointed out that the labyrinth of the child has the same size as in the adult, for the reason that a difference in size in different ages must result in tones being heard differently in the periods of growth.

Boerhaven (1668-1738) also held a view quite like the Helmholtz theory. He believed that an infinite number of cords existed in the cochlea, the varying length of which rendered it possible for the longer cords to respond to the low tones, while the shorter cords respond to the higher tones.

Zinn (1753)[3] did not accept the view that the nerve fibers lying between the lamellæ of the membranous spiral partition were thrown separately into vibration. Zinn attributed to bony striæ the ability to vibrate separately for the several tones and thus to transmit stimulation to particular nerve fibers.

Haller (1763)[4] expressed the view that tone perception is dependent on the sympathetic vibration of cords transverse to the long axis of the cochlea. The long cords at the base of the cochlea respond to the low tones, and the shorter cords near the apex to the higher tones. With the exception that he placed the longer cords in the cochlea where the shorter fibers of the membrana basilaris were found to be located, the conception of tone perception held by Haller was quite like that expressed in the Helmholtz theory.

Cotuguo in 1760[5] announced the discovery of the fact that the cavities of the labyrinth are filled with fluid and not with air. He subscribed closely to the views expressed by Valsalva regarding sound perception in the cochlea, viz., that the mechanism in the cochlea for tone perception consists of a series of bands the longest of which are located at the apex. He pointed out that since the membranous bands which respond to sound waves are soft and continually pressed upon by the fluid in the cochlea, their vibration could not continue independently, but must cease immediately as the sound waves in the labyrinth fluid ceases.

We see here that the transition from the conception of enclosed air in the labyrinth to that of enclosed fluid altered but little the theory of the physiology of the cochlea.

Goeffry (1778)[6] reverted again to the theory of air enclosed in the labyrinth, but held to the hypothesis that the membranous partition in the cochlea vibrates in response to tone impulses, and since every part of this membrane is penetrated

by nerve fibers, no part can vibrate without stimulating certain of these fibers.

Autenreich (1809)[7] accepted the view expressed by Boerhaven, Haller and others, that the perception of the various tones takes place in separate parts of the cochlea as the result of the sympathetic vibration of stretched nerve fibers.

We see, therefore, in the evolution of the theory of tone perception the development of the ideas, first, that the perception of the various tones is dependent on the sympathetic vibration of structures in the several parts of the cochlea, and second, that it is the membranous structure (the nerves themselves) which respond in this way.

The discovery of the existence of the membranous labyrinth by Scarpa in 1789[8] and of the organ of Corti in 1851[9] altered in no way these fundamental conceptions already existing regarding the physiology of tone perception. With a knowledge of the histologic details of Corti's organ, the view became generally accepted that the hair cell is the actual end organ wherein the transference of the physical impulse of sound waves to nerve impulse takes place. The actual problem in the physiology of the cochlea, therefore, becomes one of determining how the impulse of sound waves in the fluids of the labyrinth brought about a stimulation of these hair cells. It is generally accepted that their stimulation is the result of an irritation applied to their projecting hairs. There appear to be, therefore, but two possible ways for these cells to be stimulated; either the hairs receive impulses direct from the endolymph, or the irritation of the hairs is the result of an interaction with the overhanging membrana tectoria.

The theory that the hairs receive their stimulations direct from impulses in the endolymph without the intervention of the membrana tectoria has had but few adherents. Ayers (1891)[10] expressed the view that the membrana tectoria as a distinct structure does not exist; that what we designate as this membrane is but the result of the matting together of the elongated hairs from the hair cells of Corti's organ. Ayers expressed the view that these elongated hairs received their stimuli direct from the impulse of sound waves passing through the endolymph. This view advanced by Ayers has recently been restated by W. S. Bryant.[11] That the membrana tectoria is a separate structure analogous to the cupula of the

crista ampullaris, and the otolith membrane of the macula acustica is evident. An anatomic objection against the hypothesis that the hairs of the hair cells receive their stimuli direct from the impulses in the endolymph is that we do not find that physical difference between the hairs in the several parts of the cochlea which we would expect to find in a mechanism capable of being stimulated in different parts of the cochlea by tones of varying pitch. Other objections to such an hypothesis are these: In the first place, such a theory must assume that the end organ in the cochlea responds to stimuli in a manner quite different from its analogous structures, the macula acustica and the crista acustica, where we know that the stimulation of the hair cells is dependent on an interaction between their projecting hairs and a superimposed structure, the otolith membrane and the cupula, respectively. In the second place, there exists a fundamental anatomic objection against the hypothesis that the hairs may act independently of the membrana tectoria. This is the relation which exists normally between the hairs and the membrana tectoria. I have been able to demonstrate that this relation is the same as exists between the hairs of the hair cells in the macula acustica and the crista acustica and the otolith membrane and the cupula, respectively. It is a relation normally of actual contact, one which precludes the possibility in any of these end organs of impulses reaching the hairs of the hair cells without the intervention of the superimposed membrane, the otolith membrane in the macula acustica, the cupula in the crista acustica and the membrana tectoria in the organ of Corti.

The principle, however, is now generally accepted that the stimulation of the hair cells of Corti's organ is dependent on an interaction between their projecting hairs and the membrana tectoria. The actual problem in tone perception is further simplified, therefore, into one of determining how this interaction is brought about. Both Hensen and Helmholtz expressed the view that the vibration of the membrana basilaris carries the hair cells upward and brings their projecting hairs in contact with the under surface of the membrana tectoria from which they were supposed to be separated normally by a small space.

Those who have worked with the problem of tone percep-

tion since the time of Helmholtz have almost without exception accepted the hypothesis that the membrana basilaris is the active agent in bringing about the interaction between the hair cells of Corti's organ and the membrana tectoria. E. ter Kuile,[12] for example, notes that the location of the inner rods on the labium tympanicum and not on the membrana basilaris makes it impossible for the organ of Corti to be carried upwards by the vibration of the membrana basilaris, as supposed by Hensen and Helmholtz. He still clings, however, to the idea that the stimulation of the hair cells is dependent on the vibration of the membrana basilaris. This stimulation is brought about, he assumes, by the rotation of the organ of Corti around the inner rod as a fulcrum, thus brushing the hairs to and fro against the under surface of the membrana tectoria.

Ebbinghaus[13] also accepts the hypothesis that the radiating fibers of the membrana basilaris act as string resonators, but assumes that each string depending on the formation of nodes may vibrate in response to several tones.

Max Meyer[14] does not accept the principle of physical resonance, but nevertheless adopts the idea that the membrana basilaris fills the active role in bringing about a stimulation of the hair cells of Corti's organ, and builds up his theory on this hypothesis. According to the theory of Max Meyer, varying lengths of the membrana basilaris, from the base of the cochlea towards the apex, are thrown into vibration, depending on the strength of the tone. The rapidity of the vibration is determined by the pitch of the tone.

Ewald[15] also does not accept the resonator theory, but begins, nevertheless, with the hypothesis that the stimulation of the hair cells is dependent on the vibration of the membrana basilaris. He then constructs his model, having a taut rubber membrane representing the membrana basilaris, and by studying the vibration of the rubber membrane in response to sound waves he attempts to determine the manner in which the membrana basilaris itself responds to the impulse of sound waves in the labyrinth. A fundamental anatomic objection to the principle of the Ewald theory, which does not apply to the other basilar membrane theories, is the relation which exists normally between the hairs of the hair cells of Corti's organ and the under surface of the membrana tectoria. I have been

able to demonstrate, as I pointed out above, that this is a relation of actual contact, the same relation as is known to exist between the hairs of the hair cells in both the macula acustica and the crista acustica and their superimposed membranes, the otolith membrane and the cupula. According to the Ewald theory the entire basilar membrane, from one end of the cochlea to the other, is thrown into vibration for each tone in the scale, the low tones producing longer undulations than the higher tones. Only those hair cells are stimulated which occupy the crests of the waves, where alone the hairs are brought into contact with the under surface of the membrana tectoria. Different groups of hair cells throughout the cochlea are thus stimulated for each tone in the scale. In this way a peripheral tone analysis is accomplished. The theory of Ewald presupposes that the membrana tectoria is separated from the hair cells by an appreciable space. With a normal relation of actual contact established between the hairs of the hair cells and the membrana tectoria, every tone producing vibrations of the basilar membrane from one end of the cochlea to the other must of necessity result in a stimulation of every hair cell in the cochlea. Such a reaction, as Ewald himself points out, would make the phenomena of subjective tone analysis impossible.

All the theories of tone perception that attribute the active role in bringing about a stimulation of the hair cells of Corti's organ to the membrana basilaris must assume that this membrane responds at all times equally to the same impulse. This principle is fundamental and applies as well to the theories of Max Meyer and Ewald as to the resonator theories. If the membrane should not respond equally at all times to the same impulse, there could be, for example, no basis for the recognition of pitch. As I have previously pointed out,[16] there exists an anatomic condition which makes such a response a physical impossibility, and which, therefore, constitutes an unanswerable argument against any theory which places the active role in the membrana basilaris. This anatomic condition is the presence of the blood vessel attached throughout the cochlea to the under surface of the membrana basilaris. This blood vessel, I have been able to demonstrate by injection experiments, is capable of the same distention and contraction, depending on varying degrees of blood pressure, as are the

blood vessels in other parts of the body. It is evident that the vibration of the whole or a part of the membrana basilaris in response to a particular tone will be different when the blood vessel is distended than when it is contracted. There are other objections to the hypothesis that the membrana basilaris is a vibrating structure, which I have pointed out elsewhere (l. c.), but which, it is hardly necessary to mention here, since the presence of the blood vessel under the tunnel of Corti is in itself a fundamental objection.

Since it has been shown that the stimulation of the hair cells of Corti's organ is dependent on an interaction between their projecting hairs and the membrana tectoria, there appears to be but one possible conclusion, and that is that this interaction is brought about by the movements of the membrana tectoria in response to the impulse of sound waves in the endolymph. This conclusion brings the physiology of the organ of Corti into accord with that of the other end organs in the labyrinth, where the stimulation of the hair cells is dependent on the movement of their superimposed membranes, the otolith membrane and the cupula.

The idea that the membrana tectoria takes the active part in bringing about the stimulation of the hair cells is not entirely a new conception. Others have suggested such a function for this membrane, but the arguments as here set forth, showing not only that this is the logical structure for this role, but that it is impossible for the hair cells of Corti's organ to be stimulated in any other way, have not been worked out before.

Hasse[17] appears to be the first to suggest such a role for the membrana tectoria. His argument was that since sound waves enter the labyrinth largely through the oval window they must impinge directly upon this membrane and throw it into vibration. The fact that the membrane is free and not taut, he contends, should render it all the more easily affected by wave movements in the endolymph.

Siebenmann[18] also suggests that since clinical evidence goes to show that sound waves enter the labyrinth through the oval and not the round window, the membrana tectoria would seem to be the structure vibrated first and most vigorously by sound waves. He points out, too, that its variation in size and form in the several parts of the cochlea should be thought of in explaining the differentiation of tones.

Von Ebener[19] expressed himself as agreeing with Hasse that the direct excitant of the hair cells of Corti's organ is the membrana tectoria, and expressed the belief that this membrane is vibrated by the impulse of sound waves passing through the endolymph.

Kishi,[20] on the basis of some sections, photographs of which he published, representing the membrana tectoria flattened out above the organ of Corti, concludes that this membrane is attached at both ends and thus represents a series of taut bands adapted to respond to sound waves in the endolymph. He points out as objections to the theory that the membrana basilaris is a vibrating structure; that its radiating fibers are embedded between cellular layers; that if it were the vibrating structure the hair cells should be placed perpendicularly upon it; that sound waves entering through the oval window must reach the membrana basilaris without irritating the hair cells, which he thinks is impossible, and finally, that the membrana basilaris does not appear suitable to act as a vibrating structure.

In the same year (1907) I published a paper[21] in which I pointed out: That since the stimulation of the hair cells of Corti's organ is brought about by an irritation of their projecting hairs, and since the relation of these hairs to the membrana tectoria makes it impossible for them to receive stimuli direct from the endolymph, this irritation must be due to an interaction with the membrana tectoria. I pointed out also that the membrana basilaris is anatomically incapable of taking the active role of responding to the impulse of sound waves, especially because of its disappearance as a possible vibrating structure toward the lower end of the basal coil, where a perfectly formed organ of Corti is still found. The logical conclusion is that the membrana tectoria takes the active part by vibrating in the several parts of the cochlea to tones of varying pitch, in the basal coil for the high pitched tones, and in the upper coils for the tones lower in the scale. The great variation in size of the membrana tectoria from one end of the cochlea to the other, together with its complex structure, I pointed out as the physical basis which makes it possible for this membrane to respond in the several parts of the cochlea to tones of varying pitch by acting probably on the principle of physical resonance.

The following year (1908) Hardesty[22] published an article on the membrana tectoria, in which he discussed the function of this structure. His conclusions appear to me to coincide in all important points with those set forth in my paper. These are: That the membrana basilaris is anatomically incapable of taking the active role in bringing about a stimulation of the hair cells of Corti's organ; that the hairs of the hair cells are inadequate to act independently in receiving stimuli direct from impulses in the endolymph; that since the stimulation of the hair cells is dependent on an interaction between the hairs and the membrana tectoria this must be brought about by movements in this membrane. Hardesty discussed a number of possible ways by which the membrana tectoria might respond to sound waves, but appears to me to finally accept practically the conclusions expressed in my paper, namely, that areas of this membrane respond in the several parts of the cochlea to tones of varying pitch. He asserts that his conclusions represent a modification of the telephone theory of Rutherford. His modifications, however, seem clearly to constitute a substitution of the principles of peripheral analysis for that of central analysis, the fundamental conception of the telephone theory. This is clearly implied from his explanation of tone islands (page 172), where he asserts that circumscribed chalk deposits in the membrana tectoria could produce this phenomena.

In 1908 I published an article[23] in which I pointed out that the close structural analogies between the several end organs in the labyrinth seem to indicate clearly that the stimulation of the hair cells in each end organ is fundamentally alike in that this stimulation is dependent on the movements of a superimposed structure, the otolith membrane, the cupula, and the membrana tectoria, respectively. I also published some drawings of sections showing the impossibility of the membrana basilaris acting as a vibrating mechanism, and pointed out how the blood vessel under the tunnel or Corti rendered it absolutely impossible for the membrana basilaris to respond the same at all times to the same impulses.

It would seem, therefore, that one cannot escape the conclusion that the stimulation of the hair cells of Corti's organ is the result of the interaction between their projecting hairs and the membrana tectoria, brought about by the vibration of

this membrane in response to the impulse of sound waves passing through the endolymph. An actual demonstration of this response by the construction of a model seems to be out of the question in a structure as delicate and as complicated as the membrana tectoria, especially as we are as yet unable to state what are its exact physical properties. We can hardly expect that attempts to apply exact mathematics and physics in the explanation of the vibration of the membrana tectoria would lead to any very profitable conclusions, at least until we are able to determine more accurately its physical properties. The problem would seem, therefore, to resolve itself into one of determining what plausible mode of response in the membrana tectoria would best explain the phenomena, normal and pathologic, associated with tone perception.

Three possible modes of response suggest themselves. One is that tones highest in the scale produce vibrations in a limited area of this membrane nearest the beginning of the basal coil, where this structure is very small, and that each tone lower in the scale will be able to throw a larger and larger part of the membrane into vibration, until the lowest tones we can perceive will cause the whole of the membrane from one end of the cochlea to the other to vibrate. Such a response, it is evident, would fail to account for the occurrence of tone islands or of defects in the tone scale, nor would it account for the production of circumscribed areas of degeneration in the organ of Corti, as the result of overstimulation by tones of a definite pitch, as demonstrated by Wittmach[24] and Yoshii.[25] Another possible response is that the whole membrane is thrown into vibration for every tone in the scale. Such a response fails also to account for tone islands or for circumscribed areas of degeneration from overstimulation. At the same time, with such a response, the relation of actual contact normally between the hairs of the hair cells and the membrana tectoria would necessarily cause every hair cell in the cochlea to be stimulated for every tone in the scale. This response seems therefore to be untenable not only because it fails to account for the above pathologic conditions, but because it offers no plausible explanation for the phenomena of subjective tone analysis. The third possible mode of response of the membrana tectoria that suggests itself is that circumscribed areas respond in the several parts of the cochlea, each

for a tone of a particular pitch, the higher tones in the basal coil, the lower tones near the apex of the cochlea. The varying size of the membrana tectoria from one end of the cochlea to the other, together with its fibrillar structure, are physical factors which suggest how this response is possible on the basis of physical resonance. Such a response in the membrana tectoria explains most readily subjective tone analysis as well as the secondary phenomena of tone perception, and at the same time accounts readily for the important pathologic phenomena, such as tone islands, diplacousis, and the development of areas of degeneration from overstimulation. It would seem, moreover, that the work previously carried out by Helmholtz and his followers substantiating a resonator theory of tone perception should support such a response in the membrana tectoria. It is interesting also to note that such a response brings the theory of tone perception into accord with the fundamental conceptions expressed as early as 1680 by Claude Perrault, and 1683 by Duverney, that the perception of the various tones of the scale takes place in separate parts of the cochlea and is dependent on the vibration of structures in the cochlea in response to tones of varying pitch.

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XLI.

BLACK TONGUE: LINGUA NIGRA VILLOSA. WITH REPORT OF A CASE.

By Chas. H. Knight, M. D.,

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The ease with which the chief feature of nigrismus linguæ may be simulated by means of certain pigments, iron applications, etc., has prompted the statement that most instances of alleged "black tongue" are cases of intentional deception, or malingering (Hutchinson). Genuine examples are now numerous enough to exclude this assumption, except perhaps in hysterical young women. The condition seems to have been first fully described by Landouzy in 1845, although the observation of a case is credited to Lusitanus in 1557. In a very complete report by Blegvad in 1907 reference is made to a contribution by Rayer bearing the date 1835. He collected 138 cases, including ten of his own, and at the end of the present paper a few cases are added not found in his list.

The clinical history is not a matter of controversy, but the gross appearances and the microscopic picture are differently interpreted by various observers. By some it is regarded as a vasomotor disturbance allied to chromidrosis of the skin (Armaingaud). The suggestion is offered by S. Solis-Cohen that the subjects of this condition belong to that class of vasomotor defectives who often show a proneness to deposit of pigment in areas exposed to irritation, or in which the blood current is for a time slowed. He regards is as "a local proliferation, probably excited by the presence of microbes," the latter not necessarily specific. He discovers no connection with gastric disorders or with systemic infection. The tendency has been to accept a parasitic origin, although the alleged micrococcus, first described by Raynaud (1889), is always found about the filiform papillæ and forms a large constituent of the natural fur (Butlin, 1885). From a study of two cases

in healthy women, from 50 to 70 years of age, Carl Böcher (1887) concludes that microorganisms are the causative factors, since he found the affected papillæ buried in a granular mass entangling mycelial threads and many spores. Fairlie Clarke (1872) quoted Hyde Salter (1852) as referring to cases in which the filiform papillæ are enormously elongated and of a dark sepia color, due to pigment granules, but he himself offers no opinion as to cause. The same mucor niger has been applied by Ciaglinski and Hewelke (1893) to an organism found in the scrapings of a lesion and believed to be the etiologic factor. A similar organism was discovered by Sendziak (1894). A black mould found and cultivated by Schmiegelow (1896) is regarded by him as pathogenic. On the contrary Schech (1887), who at first espoused the parasitic theory, now adopts the idea of hyperkeratosis, the papillæ being enlarged and cornified, in which he is followed by Brosin (1888). A similar opinion is held by Haenisch (1908), who after a careful review of the pathologic anatomy and etiology of black tongue, holds that the fungi occasionally have no etiologic importance whatever. The microbic idea is rejected by Wyatt Wingrave, after examination of a case exhibited by Abercrombie (1901), that of a man of 32, whose attention was drawn to his tongue by persistent tickling in the roof of his mouth and a peculiar sweetish taste. In the scrapings from a black patch in the usual situation were found a large variety of bacteria commonly occurring in the mouth, the hair-like appearance being attributed to cleaving of the papillæ with keratinoid degeneration and pigmentation of the cells. Similar results in six other cases confirmed these conclusions.

After a very critical analysis of his own cases (10) and of the literature of the subject, Blegvad (1907) decides that the parasitic theory is not tenable. He finds no difference microscopically between black tongue and the ordinary furred tongue, and quotes Müller and Fuchs, who distinguish two varieties of furred tongue. In one, the genuine, the fur is made up of epithelial debris, leucocytes, moulds, food particles, etc.; the other kind, not genuine and more likely to be confounded with black tongue, is composed of keratosed, elongated filiform papillæ. His attempts to cultivate the mould scraped from the tongue in each of his cases developed many colonies of bacteria, but no brown or black moulds.

Although his microscopic examinations as well as most of those of others, have been limited to the papillæ and have not included deeper structures, where more positive signs of inflammation might be seen, he believes that the lesion begins as a slight glossitis or stomatitis resulting in prolongation of the papillæ, which afterwards become discolored by contact with certain ingesta, or by drugs taken internally and eliminated by the mouth. He found it neither infectious nor inoculable, and all experiments by others in this direction have failed. He also combats the hyperkeratosis theory, maintaining that "papillæ from normal tongues on an average are just as much keratosed as those from black tongues." The researches of J. L. Goodale (1900), which included underlying tissue together with affected papillæ, seem to prove that the lesion is primarily a glossitis and that alterations in the epithelial cells are secondary. The color is thought to be due to the presence of certain "highly refractile pigmented granules" associated with a "characteristic bacterium." From being a personal experience, the case of H. Arrowsmith (1909) has peculiar interest. He accepts the nonparasitic view, as implied in the term hyperkeratosis, which is still further established by microscopic examination of excised papillæ made by Archibald Murray. Two points in his history are noteworthy: First, the location of the patch quite to the left instead of, as usual, in the median line; and second, its spontaneous disapearance in about ten days.

Subjective symptoms are entirely absent, or may be limited to a localized feeling of dryness, or tickling, or of a foreign body. For this reason, probably, the condition is not often observed. In one of two cases reported by R. H. Johnston (1903) a sticking sensation in the tongue was complained of, but otherwise nothing extraordinary was noted. Nothing especial attracts the attention of the patient, and its discovery is often quite accidental. The affection has only an academic interest, both for the foregoing fact and because treatment seems to have little or no effect. Gradual extension of the staining over a limited area, or even to the whole dorsum of the tongue, followed by slow, spontaneous fading from the periphery towards the center, has been the general experience. The staining is totally different in character from the melanotic spots sometimes seen in the buccal cavity in Addison's disease

in conjunction with the characteristic bronzing of the skin. Butlin asserts that most cases are in poor general health, and that tonics are indicated, although he is not very enthusiastic about the result of any kind of treatment. Of three cases described by Lannois (1888) one occurred in a young girl with Pott's disease, one in an old tabetic subject, and one in a man of 62 with dysentery. Black tongue is said to be frequently developed in diabetes (Horand and Weil, 1888). Leviseur (1889) reports a case in a syphilitic and expresses the belief that it is most frequent in those debilitated by age or disease. Certainly the records seem to sustain the idea of a probable constitutional element. The senses of taste and of touch and the motility of the tongue are not affected. On the other hand Schech affirms that disturbance of the sense of taste may lead the patient to consult a physician. The latter authority also refers to the etiologic theory of Dessois that the affection is caused by a special fungus (glossophyton) not otherwise found on the tongue (?). In some cases the sense of taste is said to have been actually exaggerated or even painful.

The duration of the disease is extremely variable, from a few days to fifteen years (Sell, 1879 and 1885). Lambert Lack mentions a case having persisted "some years." Others have been known to terminate within a few weeks. The majority of cases have been noted in young people. In one cited by Butlin, a woman of 83, the hair-like papillæ loosened and fell off at the end of about a year. Desquamation is said to be common and relapses are not infrequent. In one of several cases seen by George Stoker (1890) the subject was a little child, who was also the victim of certain specific throat manifestations. A case reported by Rydigier (1891) was only 14 years of age, while Delefosse and Sahlé (1908) observed a case in a nursling.

Aside from the distinctive color the area involved has a curious, tufted, shaggy appearance owing to lengthening of the papillæ and their hair-like prolongations. The picture is likened by Schech (1887) to the "nap of a black silk hat rubbed the wrong way." His examination convinced him that the disease is not a mycosis, but is composed simply of hypertrophied, pigmented and horny papillæ. With finer fancy, Raynaud compares it to "a field of corn laid by the wind and rain." In the majority of cases a single patch is seen in

the middle line of the tongue in front of the circumvallate papillæ, but Grünwald (1903) describes and figures a case in which the patches were multiple, from light brown to black in color and produced, in his opinion, by hypertrophic cornification and pigmentary degeneration of the filiform papillæ. As to the color, while as a rule it is decidedly black, it may be light brown, or even blue or green. Changes in color may take place if the patch persists, and sometimes it looks simply like a white fur of unusual degree. In this connection it is interesting to note the fact, to which attention has been called by Butlin, that bacteria possess a remarkable capacity for assuming various tints. While they may have no other relation to the lesion, it is possible that they have some bearing upon this phenomenon.

Treatment, if considered necessary at all, is of doubtful efficacy. It is hard to place a just estimate on medication in a disease that is known to subside spontaneously. In one case reported by Masters and Smith (1891) recovery was complete in three weeks without treatment, and in another a cure seems to have been effected in a few days by the internal use of a mixture of nitric acid and nux vomica and a mouthwash of lemon juice. In Arrowsmith's case the patch disappeared in ten days without treatment, and there has been no return. The local use of a five per cent solution of salicylic acid mixed with a five per cent collodion solution followed by frequent applications of hydrogen peroxide was employed with success by Semon (1897), in accordance with a suggestion made by Unna. Brosin refers to a cure resulting from chlorate of potash gargling and mentions another case relieved by curetting (Genzner). Altogether, unless to ease the mind of the patient, there seems to be no reason for an energetic attack. The disease is perfectly innocuous in its course and consequences, so that any apprehension of malignity may be dismissed. It may appear in either sex or at any period of life. Of the cases on record a large proportion have been under middle age, and the male sex largely predominates, a fact perhaps explained by the habitual use of tobacco.

At the present time there is no evidence pointing to the existence of a causative organism. In fact, the question of etiology remains unsettled. The history of this phase of the subject is interesting, if fruitless, and is a striking commentary

on the propensity of the human mind to draw false conclusions from what the eye is supposed to see. No less than fifty different kinds of bacteria have been found in the mouth. All of these have been seen in perfectly healthy mouths, not one has been detected invariably present in black tongue, and their proportion bears no relation to the extent or intensity of the lesion. All of which would seem to dispose of the parasitic theory. The effects of mouth-breathing, of the immoderate use of tobacco, of chemical changes in the saliva have been given importance in accordance with the standpoint of the observer, but are still undetermined. As a matter of fact, some cases have been mouth-breathers and others not, some have been users of tobacco and others abstainers, while as to associated change in the character of the saliva it is quite as reasonable to suppose that it is dependent upon the same cause that is responsible for the tongue condition as that the former causes the latter.

The following case answers the description given by nearly all who have written on the subject.

The patient is a gentleman of middle age, of good habits and health, but of rather nervous temperament. He is more or less catarrhal, but the buccal secretions seem to be normal, and he has exceptionally good teeth. His digestion is good and he is reasonably careful in his diet. He is an immoderate smoker, but never drinks to excess. There is no history of gout nor rheumatism. It is impossible to discover a local or a constitutional cause of the condition. Many months, perhaps a year ago, he was startled by seeing a black spot on the middle of his tongue near its base. As it gave him no unpleasant sensation he paid but little attention to it. Looking at it at long intervals he found it was slowly spreading. At the present time it is about the size of a silver dollar and extends from just in front of the circumvallate papillæ almost symmetrically on either side of the median line. It is black at the center and becomes brownish at the circumference. The papillæ composing it are much longer than normal and are so attenuated at their ends as to resemble coarse black hairs. On separating the papillæ with a probe their bases are seen to be of lighter color, reminding one of wet chamois skin. The patch is moist and there is no apparent deficiency of saliva. There is absolutely no sensitiveness, and the con-

tact of the probe is instantly appreciated. The sense of taste is not in the least impaired. The only subjective symptom is a sensation of dryness and, as the patient expresses it, "food seems to adhere in the act of swallowing." Not sharing my scientific interest, he would not permit a microscopic examination of the papillæ. It is not likely, however, that anything can be added to what has already been done in this line by Blegvad, Goodale, Wingrave and others. He was given a two per cent watery solution of protargol with which to paint the patch once a day and was directed to rinse the mouth thoroughly with borolyptol after eating. He reports that the stain gradually faded until within a month no trace remained, although he obeyed instructions only as regards cutting down his use of tobacco.

While the preceding recital adds nothing of value to the history or pathology of "black tongue," it may serve the purpose of calling renewed attention to the etiologic importance of the vasomotor system. In our quest for germs and in our study of the internal secretions the rôle played by the nerves in the causation of certain elusive and obscure affections may have been neglected. It is not unreasonable to suppose that each of these factors is concerned to a greater or less extent in every pathologic state. The difficult matter in a given case is often to decide which predominates. In the disease under review it seems clear that bacteria are subordinate, changes in the salivary secretion are so insignificant as to be of doubtful consequence, and it remains to determine how far the nervous system is a causative agent in the curious phenomena by which it is attended. In this direction a comparison of the effect of passing across the skin of the cheek or forehead probes made of different metals—silver, nickel, copper, aluminum, gold—would be of interest (Cohen). Moreover, careful investigation might disclose various signs which are supposed to indicate functional disturbance of the sympathetic nerves.

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XLII.

CARCINOMA OF THE UVULA.

By E. M. Holmes, M. D.,

Boston.

Primary malignant disease of the uvula is a comparatively rare disease.

Newman,[1] in 1896, reported a case of adenocarcinoma of the uvula extending into the soft palate and tonsils. No recurrence for six years.

Lennox Brown[2] reported two cases in 1899; one of these died in nineteen months.

Kyle[3] in his text book, 1899 edition, page 231, gives grave prognosis in malignant disease of the uvula.

Zurakowski[4] reported a case in 1899.

Oppenheim[5] saw one in a man 81 years of age in 1901. No operation was performed.

Raynor[6] operated upon a case of malignant growth of the uvula in a man 66 years of age. This recurred in five months.

Freedman,[7] in 1905, reported four cases.

Harmon Smith[8] reported a case of operation for carcinoma of the uvula in a man 51 years of age. Operated second time at end of three months. There was no recurrence at the end of five months.

Downie[9] reported three cases in 1909. One of these cases he had operated upon and reported in 1899.[10] This man died of carcinoma in the posterior triangle of the neck, but there was no recurrence at the original site of the disease.

Case 2 was in a woman of 41 years. She was well for nearly four years after the operation, when the left tonsil became carcinomatous. The deep cervical glands were also carcinomatous.

Case 3 was a man 64 years of age, who was operated upon in 1909.

McCaw[11] operated upon a carcinomatous uvula in a woman

31 years of age and followed the operation by X-ray treatment. At the time of the report there had been no return of the disease.

Theisen[12] reported in 1901 to this society a case of carcinoma of the uvula occurring in a man 52 years of age. There was no recurrence at the end of fourteen months.

In 1908 Milligan[13] exhibited a specimen before the laryngologic division of the Royal Medical Society of London. The patient from whom specimen was removed was a man 62 years of age.

In reporting this case of epithelioma of the uvula I wish to emphasize several points of interest and importance.

In the first place, a new growth in this locality can be easily removed if only the operation can be performed in the early stages of development before it has spread into the palate and into the tonsillar area.

Early in the disease there is much less chance of the cervical lymphatics being infected, and there is, of course, much less of the surrounding tissue to be removed and therefore there is much less resulting deformity.

The chances of recurrence are very much less when there can be an early diagnosis and an immediate excision of the growth and adjacent structures.

It is evident that it is of the utmost importance that an early diagnosis be made of any indurated swelling or growth occurring in this locality, whether it presents an area of necrosis or not. In any case, the patient should be informed of the importance of having a microscopic examination of a portion of the growth, and plans should be made for an immediate operation if the examination proves the growth to be malignant.

There is particular reason for haste in removing malignant growths from this locality, as the lympathics drain into the submaxillary and deep cervical glands. The deep cervical glands, lying as they do in a network of vessels and nerves, including the sympathetic plexus, make it no easy matter to thoroughly remove them, even when there is no disease present. When malignant disease, originating in the uvula, has extended into the soft palate and into the faucial pillars and tonsil, as it did in this case, it is no easy matter to dissect about it with any feeling of assurance that the whole diseased area has been removed.

The diseases which may simulate in appearance carcinoma of the uvula are syphilis, tuberculosis, traumatism, Vincent's angina and pemphigus. Of these, syphilis is by far the most common. A necrosing syphilitic gumma may produce absolutely similar appearances macroscopically to those produced by malignant new growth.

When syphilis is present we may find other lesions of this disease. We also frequently have a clear history of the disease having existed. Even when we have other signs of syphilis and are fairly sure the disease has existed in the past we cannot feel at all positive that we are not dealing also with a malignant disease. Especially is this true if the condition is in a person past middle age. If there is doubt, the aid of a skilled pathologist should be sought. Had this been done early in the case we are reviewing, the chances are that a simple operation could have eradicated the disease. Occasionally a tubercular ulceration may produce a similar appearance to carcinoma, but it is very rare to have a tubercular ulceration of the uvula, and when this does occur there is almost always a tuberculosis of the lungs.

I have seen one case of thickened swollen indurated uvula with a foul sloughing area extending into the palate, where the spirillum and fusiform bacillus of Vincent were found. This was in a young man 22 years of age, who gave a history of a similar appearance in the tonsil a few months previously.

Trauma of the uvula is rare, and the history would likely easily decide the diagnosis.

About five years ago I saw at the Newton Hospital a uvula which presented a sloughing area surrounded by a nodular granular surface. This patient, a woman, had had pemphigus in both eyes and had a fresh blister inside the right cheek. The lesion upon the uvula was said to have began as a blister and was probably due to pemphigus.

Tuberculosis, Vincent's angina, trauma, and pemphigus so rarely produce a condition in the uvula simulating malignant growth that we need hardly to consider them.

If operated upon early in the disease, the prognosis in malignant disease of the uvula, so far as recurrence, should be as favorable as when the same disease attacks the lips or cheek. When much of the soft palate has to be sacrificed, there follow the disagreeable conditions found in congenital

cleft palate. The speech is changed and there is often difficulty when swallowing liquids to prevent their passage into the nose.

When the disease has progressed, not only must there necessarily be much of the surrounding tissue sacrificed, but there is much more liability of there being an infection of the lymphatic glands.

When a new growth located in the uvula has not advanced, the operation is a comparatively simple one, but often, as in this case, the process has extended into the pillars and into the tonsillar tissue, and the operation is not an easy one. The question must always arise, shall we remove the glands into which this area drains? Were it a simple matter to remove those glands, and were there not an accompanying shock, it would be good surgery to remove them, whether they were apparently diseased or not. But one side is as liable to be affected as the other, and both sides may be affected at the same time. Also the glands may be infected on the side showing less marked advance in the original growth. For these reasons it would not seem advisable to remove all the glands at the time of the first operation unless there were some signs of disease in one or more of them.

On September 21, 1908, Mr. D. C. consulted me for an ulceration upon the soft palate, and gave the following history:

His father and mother both lived to advanced age and died after short illness. One brother died of cancer about two years before.

Until the beginning of the present illness he had always been perfectly well. About eight months before there began to be a stiff feeling in the palate (uvula). It was sore, but not painful, except when trying to swallow. Even when eating, the pain was not serious at first. After about three weeks the patient noticed that the uvula was swollen and looked inflamed. He consulted his family physician, who gave him a careful physical examination and examined the urine. This physician said there was no organic trouble found, and the swollen uvula was likely due to some injury. He prescribed a gargle to be used every three hours. After using this wash about two weeks there appeared a little raw place at the end of the uvula, which was very sore and painful. At about this time a throat specialist was consulted. This man asked many

questions and finally told him there must have been at some time some venereal disease which he had not noticed or had forgotten. This physician painted the ulcer with some hot wash and gave a salty-tasting medicine, twenty drops in water after meals. For about four weeks the throat was treated locally three times each week. The salty medicine was increased to 60 drops after each meal.

The symptoms grew gradually worse, and the treatment was discontinued for ten days or two weeks. He was now examined at the throat department of the Carney Hospital. He was here given more of the salt medicine. Not being satisfied, the Massachusetts General Hospital was next visited. Here he was told an operation might give him relief. Unfortunately some friend advised him to consult some outside physician, who laughed at the idea of an operation and said he would surely cure him in three months' time. Now followed more internal treatment and local applications to the throat several times each week for three months. There was no improvement. At this time the patient consulted a throat specialist, who told him that he might have syphilis, but he believed he had malignant growth and advised an operation. This last examination was about ten days before he came to my office.

I found Mr. C. to be a well-nourished and healthy appearing man. The blood vessels of the face were somewhat dilated, giving a florid complexion. His speech was similar to one having cleft palate. The heart was normal, the arteries somewhat hardened. The blood pressure was 155 mm. of mercury. The urine was 1023 sp. gr. No albumin, no sugar, only an occasional hyaline cast was present. There were no enlarged glands found anywhere, neither were there areas of pigmentation or periosteal thickening. The nose was normal. Both ears showed thickened drum membranes, and there was considerable loss of hearing.

The uvula was gone and at its site was an ulcerated granular area surrounded by a nodular growth, which extended about one-half inch upon the right side and over the whole lower edge of the left side into the faucial pillars. Above this area the nasopharynx was apparently normal. There was no swelling of the deep cervical glands.

I advised immediate operation, hoping to be able to remove

all of the affected tissue. The patient did not decide to be operated upon until September 29th, when he was admitted to St. Elizabeth's Hospital and was operated upon the following day.

He took ether very poorly, and when finally he was thoroughly anesthetized it was found impossible to use the Whitehead mouthgag. We could not control the tongue to prevent choking. We were obliged to use a Denhardt gag and controlled the tongue by forceps and depressor.

The growth was removed by beginning on left side below pillars and tonsil and dissecting upward. The hemorrhage was hard to control, and so much time was necessary to keep field sponged that progress was slow. Finally we were successful in removing the pillars and tonsil, after which it was the work of but a moment to remove the soft palate. So far as possible the mucous membrane was approximated and sutured. Dr. Leary examined the mass removed and reported the structure to be that of a carcinoma. The convalescence was normal and a perfect cicatrix formed, except at the upper left border, where a granular node formed, and on November 19th I removed this with the surrounding tissue. Dr. Mallory examined the specimen and pronounced it to be a carcinoma. There has been no return of the disease locally, but on November 28th, 1909, the patient came to me for swelling in the right side of the neck, accompanied by pain. There was swelling of the deep and superficial cervical gland of the right side and also one gland under the right side of the tongue.

The patient was informed of the serious nature of his condition and the difficulty of removing the same. He finally decided to an operation for the removal of the affected glands, and on December 2nd he was admitted to St. Elizabeth's Hospital.

The following day I tried to remove all of the glands in this side of the neck. It was found impossible to make a clean dissection, as several of the glands were softened and necrotic. We used great care, but one of the glands ruptured and discharged into the wound. We so far as possible removed all of the diseased structures, but the condition was so extensive that the result seemed very doubtful.

The patient made a rapid recovery from this operation. The wound granulated and filled in rapidly and, excepting a

slight granulation at lower portion, was healed at the end of two weeks.

The patient complained of considerable stiffness and pain in the right side of the neck. There was an indurated feeling below the cicatrix in wound, no more than would usually be present after the normal healing of a similar wound.

January 29th the patient came to me complaining of much more pain, which was located behind the ear. There was a swelling about three-fourths of an inch in diameter situated behind the sternomastoid muscle. One week later this was fluctuating, and an incision opened into a cavity filled with pus and necrotic material. For three days patient was much relieved, but on the fourth day there was a chill, and there developed an erysipelas of the right side of neck and face. He recovered from this within a week, but rapidly lost strength, the whole right side of the neck gradually became involved, there was much pain, and very little nourishment was taken, and he is now nearing the end.

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XLIII.

SYPHILITIC STENOSIS OF THE NASOPHARYNX.

By J. M. Ingersoll, A. M., M. D.,

Cleveland.

All of us know how difficult it is to prevent the contraction of syphilitic scar tissue in the nasopharynx or larynx. In the oropharynx the difficulties encountered are even greater. Syphilitic adhesions between the walls of the pharynx and the base of the tongue tend to contract concentrically and gradually shut off the mouth from the esophagus and larynx and thus interfere with respiration and deglutition.

The following case of syphilitic stenosis of the oropharynx is reported because the contraction of the scar tissue has not yet been successfully prevented, and the author hopes that the fellows of this association will suggest some methods by which the difficulties may be overcome.

The patient, a man eighteen years old, was seen first in June, 1909. About two years before this date he had had a primary leutic infection. From the history which he gave it would seem that tertiary lesions had developed in the throat early. The throat had been very sore, and he had had increasing dyspnea and dysphagia. When I first saw him he was having considerable difficulty in swallowing even liquids, which regurgitated through the nose, and solid foods could not be swallowed at all. Except for a small spur the nasal fossæ were normal. The nasopharynx was almost completely closed by syphilitic scar tissue, uniting the posterior pillars and the soft palate with the pharyngeal wall, leaving an opening about one centimeter in diameter. The uvula had disappeared entirely.

Just below the level of the tongue syphilitic scar tissue could be seen extending across the oropharynx, uniting the lateral and posterior walls of the oropharynx with the tongue. About in the center of this scar tissue there was an opening one-half

of a centimeter in diameter through which the inspired air and food must pass. The opening was so small that it was impossible to secure a view below it. The breathing was labored. He had been losing flesh constantly and was quite weak and emaciated.

A free incision was made from the opening in the scar tissue to the lateral wall of the pharynx on each side under cocain anesthesia. A good view was then obtained of the larynx. All the structures below the scar tissue seemed to be normal. There was very little hemorrhage, and the patient was able to eat with a considerable degree of comfort on the following day. He rapidly gained in flesh, and when he was discharged from the hospital failed to report again for about a month. At that time the scar tissue was beginning to contract again, and another incision was made on each side into the pharyngeal walls. During the night following the operation he had considerable hemorrhage. A few days later he was given a rubber bougie and instructed to pass it into his oropharynx several times a day and hold it in position as long as possible. He then left the hospital and failed to report for observation and treatment for five months. During this period he had been fairly comfortable and had neglected to use any sort of bougie, and the scar tissue had again contracted. Incisions were again made through the scar tissue, and he was given two oval metal tubes of different sizes, with careful instructions so that he might use them and prevent the contraction of the scar tissue.

Unfortunately the patient has failed to carry out the regular dilatation with the tubes, and there is a constant tendency for the original condition to return.

Dr. B. F. Curtis reported a similar case, in which the pharynx was almost completely shut off by scar tissue. At the base of the tongue the scar tissue closed the oropharynx, except for a small perforation about a quarter of an inch in diameter. In this case a preliminary tracheotomy was done. Then a transverse incision was made on the left side above the hyoid bone, and the pharynx was opened between the epiglottis and the tongue. The scar tissue forming a web across the oropharynx was then divided. A flap was made from the skin on the left side of the neck five inches long and two inches broad, and was reflected upward so that its raw sur-

face was brought in contact with the raw surface in the oropharynx and sutured in position. Rectal feeding was carried on for several days and the flap healed in good position. After the first week the patient was fed by a stomach tube cautiously passed through the mouth. Twenty-four days after the first operation the flap was dissected back from the external edge of the opening into the pharynx and united to the mucous membrane of the pharynx. The edges of the external opening were sutured into position and the raw surface on the neck was covered with skin grafts.

Rectal feeding was again given for four days. Then the patient was allowed to swallow soft food by the mouth. Swallowing was difficult at first, but the function of the pharyngeal muscles was soon restored. After the external wound had completely healed, the tracheotomy tube was removed. There was very little, if any, tendency for the scar tissue in the oropharynx to contract. The transplanted skin in the pharynx soon assumed the appearance of mucous membrane, and the patient was apparently perfectly cured.

Dr. Curtis also mentions a case reported by Dr. Park in which it was necessary to do a tracheotomy and gastrostomy because the patient was too irresponsible to allow systematic treatment by dilatation.

Dr. Vansant reported a case of syphilitic stenosis at the base of the tongue, in which four extensive operations were performed, excising the cicatricial tissue without favorable results, and the patient finally died of inanition, refusing to have a tracheotomy done.

Dr. J. E. H. Nichols read a paper before this association at its eighteenth annual meeting describing a method devised by him for severing the syphilitic adhesions between the nasopharynx and pharynx. He passed a curved needle through the opening in the scar tissue and carried it as far laterally as the radius of the curve would permit and brought it down through the adhesions and then tied the ends loosely so as not to strangulate the enclosed tissue, leaving it in position for a week, during which time the edges of the little canal around the loop became cicatrized, firm tissue. The loop was then cut and withdrawn, and the intervening tissue between the new opening and the original opening was severed with a knife. The narow band of cicatrized tissue at the end of the

incision was enough to prevent union between the free edges of the incision.

Dr. G. A. Leland reported a case in which stenosis of the oropharynx was relieved by the method devised by Dr. J. E. H. Nichols. Part of the scar tissue on the right side of the pharynx was included in a suture, tied loosely and left in position. The suture was renewed several times, and in about two months' time it had cut through the tissue so that the opening through the scar became large enough to permit the patient to swallow liquid and semisolid foods. Several months later the same procedure was adopted on the opposite side and the opening in this way considerably enlarged. No mention is made of the length of time that the patient was under observation, and hence there is some doubt in regard to the ultimate result.

Dr. C. K. Briddon reported a case in which the incision was made through the scar tissue, and the tendency to contraction was combated by the patient using a soft rubber bougie twice a day. The case was under observation only two months, however, and the final result is not known.

Dr. W. H. Battle reported a similar case under observation for several months, in which there was a constant tendency to contraction.

Dr. Mesny in 1893 collected the report of thirty-four cases of cicatricial stricture at this level and stated that the scar tissue did not tend to contract. This opinion is not upheld by the reports of the cases which have been under observation for six months or more. In fact, the chief difficulty in the treatment of such cases is the prevention of the contraction of the scar tissue.

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XLIV.

SOME CASES OF OTITIC MENINGITIS.*

By J. E. Sheppard, M. D.,

Brooklyn.

Case 1.—Eugene W., aged 29, male, German, a brewer, was admitted to my service in the Jewish Hospital, May 26th, 1909, and came under the care of my associate, Dr. Stickle, to whom I am indebted for the following history:

There had been a discharge from the left ear since childhood following scarlet fever, accompanied by more or less tinnitus and deafness. A week ago the discharge became somewhat bloody. The present illness dates back to five days ago, when he began to suffer from severe throbbing headache, at first frontal, and, spreading until it seemed to involve the entire head, became constant and intense. The following day there was added to the headache a marked degree of dizziness, but as yet no fever. The third day projectile vomiting developed. The fourth day there was some amelioration of all the symptoms, but on the fifth day he again began to vomit, had fever, headache returned with severity, and the neck began to feel stiff. There was no pain in the ear or behind it. On admission to the hospital late on this, the fifth day of his illness, the patient was suffering from terrible headache, referred to the whole head, there was rigidity of the muscles of the neck and back, the head being much retracted, there were spastic seizures of the right arm and leg, a considerable degree of lateral nystagmus, Kernig's sign present on both sides, tache cerebrale well marked, reflexes were normal; most of the left tympanic membrane was gone, and the tympanic cavity was partially filled with granulations.

Examination of the eyes showed moderate dilatation of the pupils, which were equal, reacted rather sluggishly, and the eye-grounds were normal.

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*Read at the annual meeting of the American Otological Society, held in Washington, D. C., May 3-4, 1910.

As a result of spinal puncture there was removed 40 cubic centimeters of opaque spinal fluid, which showed 95% of polymorphonuclear cells, 4% of mononuclears, and 1% of endothelial cells, and from it there developed in the incubator the bacillus mucosus capsulatus, the same germ being found also in the material removed from the mastoid antrum and in the intradural pus.

On May 27th, the day following his admission, a radical mastoid operation was performed; a relatively large necrotic destruction of the external semicircular canal (more than half of the exposed portion) was found; the dura was opened through the floor of the middle cerebral fossa, attended by the escape from within the dura of a considerable amount of fluid pus, and two iodoform drains were introduced, one as far upward as possible, the other inward along the floor of the fossa.

Shortly after the operation the right pupil became widely dilated, and remained so for two or three weeks, during which time, however, the eye-grounds remained normal.

There was a facial paralysis, which developed on the second day after the opeation and disappeared to a great extent within a few months. As soon as he was well enough to leave his bed there was found a great unsteadiness of gait, which persisted for two or three months, but finally equilibrium was completely re-established.

On May 28th a blood culture was taken with a negative result.

On May 26th there were 18,400 leucocytes, with 75% of polymorphonuclears.

On May 27th there were 12,600 leucocytes, with 74% of polymorphonuclears.

On May 29th there were 10,000 leucocytes, with 76% of polymorphonuclears.

On May 31st there were 10,500 leucocytes, with 70% of polymorphonuclears.

The temperature a few hours after the operation reached 105°, the following day 103°, and the same eight or nine days later; the rest of the time it varied from 101.5° down to normal, at which latter point it remained after June 9th or 10th, two weeks after the operation.

In this case the pathway of infection was unquestionably

through the external semicircular canal and internal ear to the intradural space. In spite of the fact that the blood examination gave evidence of a fair amount of resistance on the part of the patient, yet the symptoms preceding operation, together with the escape of so much intradural pus at the time of operation, combined to make the case a seemingly hopeless one.

I saw Mr. W. about ten days ago, April 22d, and found his facial paralysis almost cleared up, equilibration apparently perfect, and, what was of particular interest to me, that he hears as well, or better, than before his operation.

The tuning forks from the vertex were heard entirely in the operated ear, and the absolute duration of the C fork (128 V. S.) by air conduction 0, by bone conduction 20″ the C^{111} fork (1024 V. S.) by air conduction 8″ by bone conduction 14″. Showing, I would say, normal labyrinthine hearing and that his cochlea had not been involved at the time of his acute labyrinth infection.

Case 2.—Mr. D., aged 62, was sent in to my service at the Long Island College Hospital, January 11th, 1910, from Setauket, Long Island, where he had been following his occupation as an oyster planter until five days previously. On that day, and increasingly since then, he was found to be distinctly aphasic, and complained of pain in the left ear and side of head. There was scanty discharge from both ears, and Dr. McCrae, who was in charge of him at his home, believing that the drainage from the left ear was insufficient, made a free incision of the left tympanic membrane three days before he came to the hospital.

I first saw him late in the evening of January 11th, and found him so deaf and so aphasic that it was virtually impossible to obtain any information from him. His brother informed me that he had had recurrent ear trouble in his right ear for many years, and in the left ear for not more than four or five months. He had not been specially ailing during the winter, but had attended to his very exposing work until five days ago.

There was pus in both external canals, an old perforation in the right membrane, and the recent, still open, incision in the left. No evidence of mastoid tenderness could be elicited. Temperature was 101°, pulse 76, respiration 20. Frequent

hot douching of the ears was ordered, also a calomel purge.

The next day, January 12th, he slept at intervals during the day, without much evidence of pain, although he could not speak so as to be understood. Temperature, 8 a. m., 101°; at 12, noon, 104°; at 8 p. m., 102.4°. Pulse about 100 through the day.

He was seen about noon at my request by Dr. Browning, who leaned toward a diagnosis of cerebral abscess rather than meningitis, but advised waiting a day or two for more definite data as to localization.

For January 13th, the bedside record is "that he slept at intervals, temperature lower, unable to keep patient in bed, left ear seems tender to touch. Urine scanty, oz. XXVII in 24 hours." Temperature variation from 102.4° in the morning down to 100.6° at midnight. Pulse, 76 to 100.

For January 14th, it is noted that "he slept all night, dozed at intervals through the day, slight reddish discharge from the left ear, takes nourishment better, tongue heavily coated, urine oz. XXII in 24 hours." Temperature at 4 a. m., 100.6°; noon, 99.5°; then rose steadily until at midnight it was 104°, the pulse remaining from 80 to 100. The following morning, January 15th, at 4 a. m., the temperature was 104°, but dropped by noon to 100°.

The eye-grounds were examined on January 12th and showed a neuroretinitis of both eyes, slightly more marked in the left, indicating a general increase of intracranial pressure. Urine examination was negative. Blood examination showed 18,500 leucocytes, with a polymorphonuclear percentage of 81.5%.

Operation was undertaken January 15th, at 1:30 p. m. The left mastoid was opened, and some granulations and soft bone were curetted from the antrum; the incision was carried upward, and a large area of dura exposed with the rongeur; upon entering the dura, the pia was found to be intensely congested, and well forward, over the anterior temporal convolutions, was found a large area of exudate held within the meshes of the pia; some of this exudate was removed, and from it there developed the pneumococcus in pure culture. The underlying structures were investigated for any localized collection of pus, but none was found. The patient died about 48 hours later.

In the meantime the patient had been increasingly difficult of restraint, the temperature had gradually risen to 105.5°, and the left side of the face became swollen, the tongue became thick and was drawn (or pushed) toward the right.

About eight hours after death an autopsy was performed by Dr. Murray. A discolored, softened area of bone was found in the roof of the antrum, which was presumably the path of the infection. The base of the middle lobe on the left side was covered with an exudate similar in appearance to that found at the site of the operation, and another similar large patch covered a considerable portion of the parietal lobes on the right side. There was no abscess anywhere, and the exudate spoken of was nowhere of such a consistency as to be characterized as liquid pus, nor is it conceivable to my mind that material of this kind is in the slightest degree likely to make its escape through any such opening in the dura as has heretofore been recommended for the relief of this class of cases.

CASE 3.—Peter H., aged 24, a deckhand, was admitted to the Long Island College Hospital, January 29, 1910. There was a history of pain in the right ear three weeks ago, followed after about two days by discharge. He had suffered somewhat from dizziness, but had walked a considerable distance to and from his work until the day before he entered the hospital. On the same day he seems to have developed a facial paralysis.

He was admitted to the hospital late in the evening of January 29th, with a temperature of 105°, was unconscious, the neck was rigid, the limbs also were flexed and rigid.

On January 30th I saw him about noon, Dr. Browning about 4 p. m.; facial paralysis was marked, neck and limbs rigid, some indistinct evidence of mastoid tenderness; there was pus coming through a seemingly sufficient opening in the tympanic membrane; no sagging of canal wall.

A spinal puncture was made, and about 1 oz. of turbid spinal fluid was withdrawn; was entirely irrational; involuntary urination. There was a leucocytosis of 25,000 and a polymorphonuclear percentage of 85.

Urine examination showed some albumin present, and casts taking on a granular form.

Dr. Browning and I concurred in the diagnosis of menin-

gitis, and we both felt that the evidences of its general fulminating character were so unmistakable as to make an operation at that time an entirely hopeless undertaking.

Temperature at 4 a. m., 102°; 8 a. m., 103.6°; 12 m., 104°; 4 p. m., 105°; 8 p. m., 104°; midnight, 103.5°, with a pulse ranging from 82 to 108.

January 31st, still unconscious, very restless and noisy, urination involuntary. Takes no nourishment. Temperature, 103.5° at 4 a. m. down to 100.4° at 4 p. m. and up to 102° during the evening, with a pulse varying from 80 to 100.

February 1st, very restless and noisy most of the night, still urinates involuntarily. Spoke a few distinct sentences in the morning, becoming more rational as the day advanced, and began taking nourishment. Temperature at 4 a. m. 101° and slowly fell to 98.6° by midnight, with a pulse from 80 to 90.

From this time there is nothing very worthy of note except that the patient's condition improved from day to day. For a week complained of severe pain in the left side of head—he developed a boil in the external canal.

By February 14th he was so far convalescent as to be up and about the ward; temperature and pulse were normal, headache virtually gone. February 12th, a blood examination showed 20,000 leucocytes and 81% of polymorphonuclears; mastoid symptoms gone, tympanic membrane healed and hearing returning. There was no growth from the spinal fluid.

This case would seem to me to be somewhat of an upset either to our ideas of diagnosis or to those of prognosis of otitic meningitis; either we cannot be certain of a diagnosis of meningitis in the presence of practically all its recognized symptoms, even including that of an opaque spinal fluid, which I have heretofore looked upon as final and conclusive, or else we must modify our ideas of prognosis and admit that an occasional case may recover even without operative interference; and if we choose this latter horn of the dilemma, then may the question not be asked with some show of justification, "How many of the reported recoveries after operation might have recovered if left alone?"

Another question arises in my mind as perhaps worthy of our consideration, as a result of the findings in cases Nos. 1 and 2 of this series, and of observation in other cases on the operating and autopsy tables: Are there not two kinds of

otitic suppurative meningitis? One class in which fluid pus is found within the dura and in which drainage offers some hope of cure, and another class in which the pus, or exudate, is held suspended within the meshes of the arachnoid or pia, and in which drainage offers but little or no prospect of relief?

Are they two distinct processes, or only different stages of the same process? If different processes, does one present a possibly better prognosis than the other? And if so, can we attach to each a sufficiently distinctive combination of symptoms to enable us to determine beforehand in which cases operation may or may not be wisely undertaken?

130 Montague Street.

XLV.

VINCENT'S ANGINA INVOLVING THE LARYNX EXCLUSIVELY.

By H. Arrowsmith, M. D.,

Brooklyn.

My purpose in presenting this report is to put on record a case which seems to be unique in the history of this disease. The bacteriology, pathology, symptomatology, diagnosis and treatment of Vincent's angina having been hitherto so exhaustively covered by various writers, will be entirely omitted.

J. N., male, 26½ years of age, U. S., married, a stableman, formerly a U. S. naval apprentice, came to my clinic at the Brooklyn Eye and Ear Hospital on August 27, 1909. During the previous week he had experienced a deep-seated sensation of discomfort in the throat, with gradually increasing hoarseness and dyspnea, which latter was pronounced at the time of his admission. His family history was negative. In 1899 he had pneumonia and gave a vague history of an attack of beri-beri lasting two months, while he was in the navy in the Pacific. He has been a very moderate user of alcohol, a smoker and denies any venereal infection. He has had occasional slight sore throat. Physical examination of the thorax was negative, pulse and temperature normal, respiration decidedly embarrassed. There was slight swelling of the neck externally. Laryngoscopy showed edematous swelling of the epiglottis, arytenoids and ventricular bands, and as his condition seemed serious, he was sent to the wards for observation.

His urine contained a trace of albumin and a small amount of sugar and microscopically a few granular and hyaline casts. He was passing about fifty ounces a day.

About twenty-four hours after admission to the hospital his dyspnea became so urgent that the house surgeon was obliged to do a hurried tracheotomy. This entirely relieved

the laryngeal symptoms; the tube was removed after four days, and the tracheal wound was completely healed by the third week. There was nothing of moment in the laryngoscopic picture, beyond a slight tumefaction of the epiglottis and the ventricular bands. His voice had recovered its usual tone and the discomfort and dyspnea were completely relieved. He was discharged, but returned on October 4th, with recurrence of hoarseness, dyspnea and swelling of the soft tissues of the neck.

The skin incision had reopeend and was discharging very foul smelling pus, which had collected in the peritracheal soft parts and could be pressed out in considerable quantity. Several small abscesses were incised, and quite an amount of pus was liberated. No communication with the interior of the trachea could be discovered. The pus from these suppurating tracts was found to contain immense numbers of fusiform bacilli and spirilla of Vincent. Most unfortunately, owing to a misunderstanding, the sputum was not examined at this time, so that it is uncertain whether or not these bacteria were then present in the laryngeal and tracheal secretions.

On October 10th his dyspnea demanded a second tracheotomy, and smears from the interior of the trachea showed almost a pure culture of the specific germs, as did also sputum obtained by coughing. A blood count showed a moderate anemia—hemoglobin 68%, erythrocytes 3,867,000 and some leucocytosis—17,400. Urinalysis: A trace of albumin, no sugar, indican in excess, a few casts.

The tracheal secretions were extremely offensive and very viscid, necessitating frequent cleaning and removal of the canula. The odor persisted for weeks. During the ensuing six weeks frequent examinations of the sputum, tracheal secretions and granulation tissue from the tracheal wound showed almost pure cultures of the spirillum and fusiform bacillus, at times mixed with pneumococci, staphylococci and streptococci.

As his symptoms showed no amelioration and practically no air passed through the larynx when the tracheotomy tube was closed, on November 5th, I did a thyrotomy and inserted a Jackson's laryngostomy tube for the purpose of keeping the larynx open for topical applications and with the hope of averting future deforming cicatrization. When the larynx

was split I removed a mass of friable, cheesy exudate, which teemed with the specific germs. Beneath this exudate the mucous membrane was eroded and bled easily, and in spots the bare cartilage could be felt. The laryngofissure made the local treatment of the interior of the larynx and the trachea very easy and satisfactory.

The patient received a thorough antisyphilitic course of medication without benefit, and at my request Dr. Archibald Murray made a Wassermann test after the Noguchi method with absolutely negative results, thus presumptively eliminating syphilis as a factor.

At this point, on account of personal illness, I was unable to see the patient for several weeks, and for some reason, which has never been made clear, the laryngostomy tube was removed and the ordinary tracheotomy tube reinserted on November 19th. When I saw him again the thyrotomy wound had closed, down to the tracheal opening. About December 1st the patient had almost complete suppression of urine—albumin was 30% by bulk, no sugar, urea greatly diminished, casts of all descriptions, renal and vesical epithelium and free blood. For several days he had decided symptoms of uremic poisoning, and since that time has had several less severe recrudescences of his kidney symptoms. An examination on April 14th showed: Specific gravity 1012, albumin 10% by bulk, urea 1%, indican excessive, hyaline, granular, fatty, epithelial and blood casts, free blood and leucocytes.

By the middle of December the fusiform bacilli and spirilla had practically disappeared from the sputum and secretions, and cicatricial contraction had produced marked stenosis of the larynx. The patient has since been unable to breathe at all adequately through the larynx with the tracheal tube closed, but can phonate in very raucous and inharmonious tones. For more than a month daily attempts were made to dilate the larynx with Schroetter's tubes, but it has never been possible to introduce the fourth tube in the ascending scale, and as there was no apparent improvement the attempt has been abandoned. The larynx will now admit a fair-sized goose quill, but its structures are thickened and rigid.

Owing to the condition of the kidneys, I have not thought it justifiable to subject him to further operative attacks, as

he is fairly comfortable generally and perfectly so as far as his ability to breathe is concerned.

The temperature throughout his illness has been practically normal, the highest point, 100 3/5, being just prior to the evacuation of the pus in the neck. At no time was there any oral or pharyngeal evidence of the specific lesion in question nor any involvement of the adjacent lymphatic glands, which has been a prominent and distressing symptom in the other cases of Vincent's angina that I have seen.

It would have been most interesting to determine whether the primary seat of infection had been within the larynx or tachea, or in the peritracheal areolar tissue. I have not been able to find in the literature that the spirillum and the fusiform bacillus have ever been identified in pus from abscess cavities or sinuses.

As complementary to the foregoing, the history of a recent case is of interest:

C. S., aged 41, male, U. S., a tutor, came to my clinic on April 20, 1910. Since October, 1909, he has suffered from gradually increasing hoarseness and dysphagia, which latter has become greatly aggravated during the past three weeks, so that now he is able to swallow fluids with the greatest difficulty. Coincidentally with the increase of his dysphagia a painful swelling of the submaxillary glands of the right side made its appearance. Since the commencement of his illness he has progressively emaciated and has had more or less cough.

Laryngoscopic examination showed so much swelling and distortion of the supraglottic structures that the vocal bands could not be seen. The laryngeal surface of the epiglottis, the arytenoids and the ventricular bands were covered by a thick, dirty, whitish exudate, and my first thought was of extensive malignant disease with sloughing. Part of this exudate was scraped off, revealing a bleeding surface beneath. Physical examination of the chest showed infiltration of the right lower lobe, bronchovesicular respiration and some moist rales.

Dr. B. F. Cline, our pathologist, reported immediately as follows: "The exudate from the throat of C. S. shows numerous fusiform bacilli and spirilla of Vincent, with occasional streptococci and staphylococci. The sputum shows occasional tubercle bacilli."

The implantation of an infection of this kind on a pre-existing laryngeal tuberculosis is also, I believe, hitherto unrecorded. No exudate was discoverable elswhere than in the larynx. Presumptively the intense aggravation of the pain, dating from three weeks before he consulted us, as well as the glandular involvement, marked the onset of the infection by the specific germs.

He has not returned since the first visit.

170 Clinton Street.

XLVI.

A CASE OF TYMPANIC VERTIGO.

By J. E. Sheppard, M. D.,

Brooklyn.

Miss M., aged 26, first consulted me September 29, 1909, upon the recommendation of Dr. Frederick C. Eastmann.

She stated that for two years she had been treated by several specialists in Brooklyn and New York, and that a diagnosis of Meniere's disease had been repeatedly made.

Previous History.—Over two years ago she had a moderate attack of dizziness, and three or four months later began to grow dull of hearing in the left ear, the deafness having since then steadily, though slowly, increased. About six months after the first attack of vertigo she had a second attack, followed by another two or three months later. These attacks have increased in frequency and severity until now she averages four or five attacks daily; often wakes up dizzy during the night; on two occasions has fallen (both times backward); has never lost consciousness, but usually feels drowsy after and sometimes before the attacks; has frequently vomited during the attacks; some time after the trouble began constant tinnitus was added to the other symptoms, but does not seem to have been especially worse during or after the attacks of vertigo. Two or three times a month she has rather severe headaches, mostly frontal, and not apparently connected with the dizzy attacks. No evidence of stomach, bowel or uterine trouble. She wore glasses when at school, but gave up their use nearly ten years ago.

Tuning Fork Tests.—From midline, vertex and teeth, both C and C^{111} forks were heard better in the unaffected ear. The absolute duration and relative intensity tests, I would say, indicated "mixed," middle and internal ear disease of only moderate severity, certainly not a pure labyrinth lesion. Watch, 8″/72″. Speech and whisper, 20 feet. The tympanic mem-

brane was moderately retracted and opaque, with a rather small light reflex.

On using Siegel's otoscope the membrane moved freely, excepting only the manubrium mallei, which remained quite stationary, and on rarefying the air in the canal some dizziness was caused. The eustachian tube was shown by the catheter and diagnostic tube to be perfectly free and dry.

In the nose the following abnormal conditions were found: The septal cartilage, high up, was either split or covered with a greatly thickened mucosa, probably the former, so that there was some pressure between it and the right middle turbinate. The left middle turbinate cystic, probably the remains of an old ethmoiditis.

In the nasopharynx was found a rather thick adenoid pad, scarcely enough, however, to be obstructive to nasal breathing.

I recommended to Dr. Eastmann that, first of all, on account of the frequent headaches and the former use of glasses, the eyes be eliminated as a probable source of the vertigo, and they were accordingly examined by Dr. Edward Wright, who reported astigmatism of both, but more of the left, and ordered glasses, which were worn two or three weeks with seeming relief of the headaches, but with absolutely no effect on the vertigo.

Consequently on October 19th, I advised as the next step in our process of elimination, and this recommendation was made solely because of the above-mentioned immobility of the malleus handle, as shown by Siegel's otoscope, that a link be removed from the chain of ossicles, and the incus was at once removed in the office under cocain anesthesia.

On November 18th, one month later, I made the following note: "After the first day or two of slight upset following the operation, and as long as the opening remained in the tympanic membrane, the patient was entirely free from vertigo and was able to go out and about with more assurance than at any time during the past year." During the next few days after the membrane healed, and this I am at a loss to explain, she had a few mild attacks of vertigo, and I was just on the point of recommending as the next procedure that the adenoid pad be removed, when the vertigo ceased and she has had no further attack from that time to the present.

The tinnitus remains unchanged, and there has been a moderate increase of the deafness.

That this case should never have been classed as one of Meniere's disease, properly so-called, will, I think, be readily admitted by all of us, both from the character of the attacks, if carefully analyzed, and from the tuning-fork tests.

But I am not so sure of my ground when I endeavor to trace the connection between the immobility of the hammer handle and the interference with equilibration. My reasoning was that along with, and probably on account of, this immobility in the outer part of the chain, it was perhaps fair to assume that the foot-plate of the stapes was more or less firmly pressed into its niche in the oval window in such a way as to interfere with the tension of the intralabyrinthine fluid, through a disturbance of the compensatory provision of the membranes of the round and oval windows spoken of by Dr. Blake in his paper, read last week before the American Laryngological, Rhinological and Otological Society.

130 Montague Street.

XLVII.

ACUTE INFECTION OF THE LARYNX, DIAGNOSIS AND TREATMENT.*

By F. E. Hopkins, M. D.,

Springfield, Mass.

Acute infection of the larynx, while not imperiling life, except, perhaps, in the phlegmonous variety, is yet freighted with possibilities of disaster to both patient and physician: To the patient because of the distress, apprehension and risk to function involved in the process, the possibility of damage to function being a reality, even to the average person, while to singers and public speakers it assumes a measure of great importance. To the physician there is the hazard to reputation if he do nothing, and an equal hazard if he do nothing effective or if his prognosis prove sadly erroneous.

The presentation of the subject of acute infection of the larynx has always lacked the definiteness and precision which it is possible to give to descriptions of like processes occurring in neighboring regions. This indefiniteness may be due in part to the lack of independent bacteriologic study of diseases of the larynx; and in part to the persistence in functional activity which so often prevails, whatever the stage or degree of inflammation.

Laryngeal diphtheria and tubercular infection of the larynx are exceptions to the foregoing general statement, and it is not proposed to consider either of them at this time, because of the degree of definiteness already attained in their handling.

Treatment, too, is empirical. A mild case even under treatment may persist for a long time if the patient insists upon use of the voice, since functional activity aggravates the laryngitis and favors the continued bacterial inflammation, or a severe case involving distress, cough and hoarseness may

*Written for the 1910 meeting of the American Laryngological Association.

make steady improvement with little care beyond absolute functional rest and intelligent regard for surroundings. Hence the value of treatment has been made to appear an uncertain quantity.

Now if a bacteriologist, moved by a desire to add to the sum of medical knowledge—and incidentally secure for himsef the satisfaction of investigating a region as yet comparatively virgin—were to study infections of the larynx, he might be able to gain information which would lead to greater exactness in treatment, and shorten in good measure the course of acute infectious laryngitis. In the event of his success he would know that he had accomplished a definite advance, which is itself a generous reward. Patients might be only subconsciously grateful to him, and laryngologists might take to themselves much credit for following out the effective measures his study had indicated, yet the main reward would still be his.

As a matter of fact, the one real excuse for the appearance of this paper upon the program is to call attention anew to the need of independent bacteriologic study of diseases of the larynx, and if it may serve to direct the attention of bacteriologists to this need it will have accomplished a good purpose.

Primary infection of the larynx may occur in such grave disorders as diphtheria, tuberculosis, and phlegmon, as well as in the milder infections of influenza, etc., yet it is so constantly associated with or secondary to affections of the nose and pharynx that clinically the entire upper air tract must be included in the consideration of every case. The acceptance of the germ theory, and the explanation of inflammations of the respiratory passages as due to one, or another, or a combination of infections, cannot well be made more striking than by giving the etiology of acute laryngitis, from two of the older text books whose authors, in erudition and clinical experience, deservedly rank among the foremost laryngologists.

"We are generally taught that a sore throat or an acute laryngitis is the result of an exposure to cold, and this undoubtedly is the immediate exciting cause of the attack in the large majority of instances, but underlying this, I think, almost invariably, we shall find that there exists a mild chronic inflammation of the mucous membrane of the larynx, which, under the influence of an exposure, takes on an acute exacer-

bation. In other words, given the chronic inflammation, recurrent attacks of the acute inflammation become a prominent symptom. This point I regard as a somewhat important one, furthermore, I am disposed to think that an inflammatory process in the larynx is very rarely, if ever, a primary affection, but is secondary to an inflammatory process involving some portion of the air tract above. This is either an obstructive lesion of the nasal cavity proper, or some morbid process in the nasopharynx." (Bosworth.)

"It is generally stated that the exciting causes of a catarrhal laryngitis are similar to those which lead to the edematous form, only that they are modified by the intensity of the factor, or by action on a system less receptive of the baneful influence. Successive authors, following their predecessors, have taken no trouble to ascertain whether the nature of the "cold catching" or catarrhal factor, has any influence on the character of the resulting inflammation; and we thus find the same atmospheric and hygienic causes ascribed indiscriminately as predisponents or excitants of every variety of laryngitis.

First in importance amongst the causes of mucous laryngitis are the atmospheric, the principal of which is the inspiration of moist cold air, especially by those who habitually breathe through the mouth, or in the subjects of temporary nasal stenosis. Gottstein considers that 'no mucous membrane,' except that lining the nose, is so prone to inflammation, as a result of climatic influences, as that of the larynx." (Browne.)

Practically the same opinions are held to-day—accepting lowered resistance, local and general, in place of the chronic inflammation quoted; and regarding the constant or accidental presence of a variety of bacteria in the nose and throat as causative of the particular acute attack.

Within the limits of this title, only the infective forms of laryngitis may be considered, and while this covers a long list of cases, those are necessarily excluded which are due to traumatism—so to speak—as over-use or wrong use of the voice, or such as may be caused by the inhalation of irritating vapors or gases, as chlorine, ammonia, sulphur, or a smoke-laden atmosphere.

Since the direct etiology is implied in my title, only the pre-

disposing or contributing causes call for enumeration. These causes are local and general. Every text book takes up this branch in detail; moreover, this society does not stand in need of instruction in such elementary items, yet for a reasonably symmetrical presentation of the subject it is necessary to pass these contributing causes briefly in review, because of their importance and because of their necessary inclusion in treatment.

CONTRIBUTING CAUSES.

First among such are diseases and abnormalities of the nose and pharynx, such as the obstructive lesions which compel mouth breathing, and those attended by a discharge of mucus or mucopus, as postnasal catarrh and sinusitis with its drainage of pus upon and into the larynx.

Systemic causes, resulting in lowered vitality, which means diminished resistance. Under this heading are included some diseases in which are combined a local and general infection, as in the laryngitis of typhoid fever, measles, scarlatina, diphtheria, variola, etc.

Occupational causes, illustrations of which are to be found in street criers, trainmen, especially guards and brakemen who call out the stations, and to be included are also singers who must keep professional engagements when the larynx is not fit for functional activity. These, in reality, are all cases of chronic inflammation cited as predisposing cause by the early writer quoted, since the persistent use of the voice under such conditions induces congestion of the mucous membrane of the larynx and favors infection.

Among those whose occupation exposes them to especial risk of infection are the nurses and attendants of patients suffering from contagious diseases, and these people ought always to be advised of measures they may take for protection.

DIAGNOSIS.

Had this branch of the subject reached the measure of definiteness to which we hope it will yet attain, the first and principal item in diagnosis would be its determination by a bacteriologic examination. In fact, this solution is implied in the title, for given an infective inflammation the determination of the causative bacteria should at once lead to intelligent ap-

plication of means to a cure. Even now bacteriologic examinations are employed, yet the plan is applied with reference to the whole upper tract oftener than to the larynx.

Whatever perfection bacteriology of the larynx may reach, we must yet examine with the same care as ever for the stage and degree of inflammation, the area involved, the destruction wrought by necrosis, etc.

The trained observer will often reach a measure of accuracy as to the character of the diseased process, from the sound of the voice, as is so often instanced in tertiary syphilitic lesions of the larynx. He will also distinguish differences due to swelling within the larynx or involving the cords, also such as are due to muscular pareses. All this is but saying that every aid, whether of bacteriology, laryngoscopy or trained observation of eye or ear, is brought to the aid of diagnosis.

The diagnosis in a given case becomes the determination of the existence of an acute laryngitis, whereupon bacteriology is called upon to differentiate the particular bacteria causing the inflammatory process. In the average case, usually due to pneumococci, streptococci, staphylococci or Pfeiffer's bacillus or a variegated combination of these, the determination of the existence of such bacteria is sufficient, a differentiation not being at present of therapeutic significance, since the agents at our command for the destruction of the invading hosts are but limited. We are thus obliged to use much the same local applications, whatever the bacteriologic findings, but prognosis is made more intelligent if we may know the particular exciting agent of an inflammatory process, while continued investigation of causes will bring progress in treatment.

In the laryngitis of the exanthemata, the history of an epidemic, the examination of the patient or the bacteriologic findings will suffice to fix the diagnosis. In the laryngitis of typhoid fever, too, there are usually the same collateral aids to diagnosis, since the serious lesions of edema or ulceration do not occur until as late as the second week.

Tubercular laryngitis affords a wide range of appearances from the pretubercular congestion, through the various phases leading to edema and destructive ulceration, yet the picture presented by the general disease is so well known and the microscope is so early called in aid, that diagnosis is not likely to remain in doubt. The same may be said of the erythema and superficial ulceration of secondary syphilitic lesions, and

it is more true of the indurations and deep ulcerations of the tertiary stage. Bacteriology may not here offer assistance, these lesions being dependent upon the constitutional infection, though respectful hearing will be granted our bacteriologic knight-errant who will undertake to tell us of all the elements entering into this particular necrotic process.

The grave infections of erysipelas and phlegmon are not mentioned in this hasty sketch, for it is well understood by such an audience that the mild local measures to be advocated under the head of treatment, could at best but be prophylactic with reference to these disorders.

Treatment may well be considered under the divisions of prophylactic, local and general, naming them in order of their importance.

Prophylactic is properly placed first, since if the nose, nasopharynx and phraynx could be kept of normal capacity and even approximately free from bacteria, infection of the larynx would be rare indeed. Much evidence is accumulated to the effect that all air-borne diseases find their entrance to the system through the portals of the nasopharynx and pharynx. How important, then, to make difficult the lodgment here of cocci of any sort. Strictly speaking, under the head of prophylaxis would fall the consideration of all the obstructive lesions of the nose and throat, and the care of every mucopurulent process, including sinusitis; but a simpler suggestion is in mind.

Speaking first of those especially exposed to the risk of contagion, as nurses and attendants upon those suffering from contagious and infectious diseases, free use many times a day should be made of mild alkaline and antiseptic solutions—such as Seilers'—by means of spray, douche and gargle, or a more active antiseptic agent, such as that recommended by Pierce:

R. Acidi salicylici ..... dr. x.
Spts. ætheris nitrosi.....
Alcohol .....aa oz. j
Formalin.....(1-10) oz. ss. to oz. j
Ol. carophil .....dr. j
Glycerin .....q. s. oz. x.

M. Sig.—A half teaspoonful of this to half glass hot water is to be used as a gargle and mouth wash.

In addition to attention to such matters of local hygiene, the highest measure of resistance should be cultivated by exercise, fresh air and good food. Germs we have with us always—keep them away and the doors locked, so far as may be.

For use in the nose and throat we are compelled to employ solutions of but mild germicidal power, yet there is no doubting the efficacy of their free use as suggested; and this should be insisted upon for those especially exposed.

The direct treatment becomes that of caring for the acute laryngitis, and this demands first of all absolute abstention from the use of the voice. Rest in bed in a room the temperature of which is maintained at about 70. The inhalation of steam impregnated with comp. tinct. benzoin, the taking of hot drinks, the use of calomel in divided doses, to be followed by a saline, the application to the throat of a compress wrung from cold water and covered with a flannel bandage, the employment of ice externally in the grave infections, as phlegmon, all contribute toward gaining prompt control of the acute process.

For its control of the circulation and its aid toward prompt recovery, I recommend with much confidence the following:

R. Atrophin sulph..... gr. 1/700
Heroin ..... gr. 1/24
Caffein ..... gr. ¼
Pyramidon ..... gr. ij

M. et ft. Caps. No. 1. Sig.—Take one capsule every four hours.

Cold sprays thrown directly into the larynx are of much greater value than warm steam inhalations; and we should wander far from our title if effort were not made to influence a local infection by the direct application of some germicidal agent. It is true that we are much restricted, since no risk may be taken of injuring the patient through our efforts to destroy the bacteria.

Happily we have in argyrol an agent of proved clinical value and a nonpoisonous product. It is true that in the laboratory argyrol has not made a notable record as a germicide, yet much experience with its employment in ophthalmologic clinics has made for it enthusiastic advocates. It does not apparently blanch the tissues, yet practically it acts as an astringent;

though in the laboratory it is not a poweful germicide, applied to mucous membranes it has that effect, and that without causing local irritation.

We have need here that our bacteriologist prove himself a physiologic investigator as well as a learned laboratory expert, that he may give the scientific explanation of processes sufficiently satisfactory empirically, but as yet lacking accurate description.

The local treatment is, first the thorough cleansing of the surfaces with an alkaline spray, this to be followed by adrenalin to blanch the mucous membrane and reduce the congestion, then the application, also by means of a spray, of a solution of argyrol in strength of from 20 per cent to 40 per cent.

This is for general consideration—specific processes like those of diphtheria, tuberculosis, erysipelas, phlegmon and syphilis must have their appropriate treatment. Fortunately the great majority of cases, presenting themselves for care, fall into a list making them amenable to the treatment described, and the employment of this plan will give satisfaction to both patient and physician.

XLVIII.

HISTORY OF A CASE OF RECURRENT PAPILLOMA OF THE LARYNX, EXTENDING OVER THIRTY YEARS, DURING WHICH TWO THYROTOMIES WERE PERFORMED.*

By Francis R. Packard, M. D.,

Philadelphia.

The patient whose case I report, has been kind enough to write me out a brief epitome of his history before coming to me, which tells the story so well that I have merely transcribed it.

"I was born in Birmingham, England, on September 1st, 1838. In 1880, being then occupied as an auctioneer, I noticed my voice beginning to get husky. In the spring of 1881 I caught a severe cold, due to getting soaking wet, and my voice rapidly failed me. I then sought medical advice, but getting no relief from one, consulted others with the same result. I found they were all treating me for syphilitic sore throat. I then, under the advice of Dr. Kenny of Birmingham, who had consulted Sir John Sawyer as to the nature of the trouble, came to Philadelphia, and went to the University Hospital. This was late in November, 1883. At the University of Pennsylvania I fell into the hands of Dr. John Sheets, of Philadelphia, who was then assistant to Dr. Seiler, who at once diagnosed my trouble as multipapilloma of the larynx. After many intralaryngeal operations by Dr. Seiler, and many more by Dr. Sheets, each of whom removed much growth, they both stated it returned as fast as it was removed. In April, 1884, I visited Bellevue Hospital, New York City, and attracted the notice of Dr. Seeler, of Newark, N. J., who performed very many operations with the forceps. I attended Dr. Seeler's office until late in September, when, by his advice,

*Read at the meeting of the American Laryngological Association, May, 1910.

I went to the New York Polyclinic Hospital, and became an outdoor patient. Dr. Gleitsmann took a special interest in me, and after a time he invited me to attend his private office, where for some months he tried his very best to clear my larynx. He tried everything then known to the medical profession, but although he removed an immense lot of papilloma it seemed to return again in twenty-four hours. At length, to save my life, he persuaded Dr. Gerster of New York City to perform a laryngotomy. The operation took place in July, 1885, and appeared to be a complete success, but in 1887 the growth reappeared. I consulted Dr. Gleitsmann, who succeeded in removing part of it, but the position the growth had taken defied all efforts to remove it. The operations performed by Dr. Gleitsmann, Dr. Lederman and Dr. Sheets carried me along until 1904, when I fell into your hands. The rest of this little story you know better than I do."

I first saw the patient on the 19th of October, 1904. He was then 66 years of age, and had had laryngeal trouble for twenty-four years. He was a strong, large, healthy-looking man. His voice was so husky that it was with difficulty that one could understand what he tried to articulate. His breathing was also laborious, with considerable inspiratory dyspnea. Upon examination, his larynx was found almost occluded by large papillomatous masses projecting into its lumen below the cords on both sides and from the anterior commissure. There were also small papillomatous masses upon both cords. At this time, and in a number of subsequent sittings, I removed pieces of the growth, but did not succeed in extirpating it, as it recurred with the most wonderful celerity.

In February, 1905, I took him to the Pennsylvania Hospital, where Dr. Le Conte divided the thyroid cartilage anteriorly and removed large masses presenting the typical appearance of papilloma. These were submitted to a microscopic examination, and the report was as follows:

"Specimen consists of a very small, somewhat dried, gray translucent piece of tissue.

Microscopic Examination.—Sections from small tumor of the larynx show it to be largely composed of a thick layer of squamous cell epithelium, resembling the thickened corium of the skin. Lying beneath this layer is a well-defined univaded layer of connective tissue. A small amount of blood is seen

lying outside the tumor mass. No inflammatory changes are seen. No signs of malignancy.

Anatomic Diagnosis.—Benign papilloma of the larynx.

He made a good recovery from the operation, and his respiration became practically normal. His voice continued somewhat husky, but he could be distinctly understood. From time to time since the operation I have seen him, and he has continued to remain in excellent condition, both generally and locally.

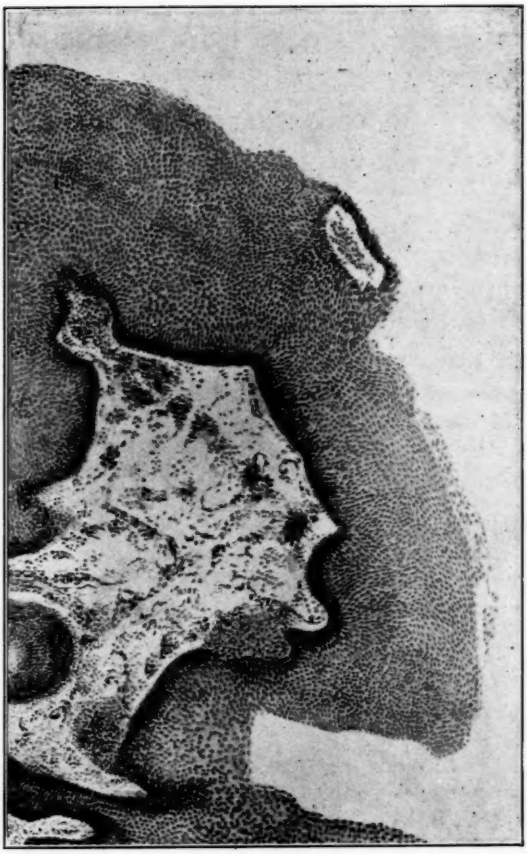
On April 12, 1910, when I last examined his larynx, it presented a small irregular projection in the anterior commissure, which I think is nothing but the scar or stump left by the removal of the growth in 1905. His vocal bands have the appearance of narrow, thick cords, and are a good deal reddened and thickened along their inner margins.

The interesting points in this case are:

1. The long time during which the patient has been under observation, and throughout which intelligent treatment has been directed towards the relief of his condition.

2. The fact that throughout that period, practically as far as can be known, there has been no change in the nature of the neoplasm.

3. The fact that this growth is so typical as to etiology, occurring in an auctioneer, as to progress and recurrence in spite of repeated removals, as to growth and microscopic appearance, and lastly, as showing no tendency, in spite of repeated operative interference and traumatism, to undergo any malignant degeneration.



XLIX.

A CASE OF SUBMAXILLARY ABSCESS CAUSED BY THE USE OF AN INFECTED TOOTHPICK.

By Clarence Porter Jones, M. D.,

Newport News.

Archer Davis, white, male, age 24 years, robust in health, with excellent family and personal history; a grocer by occupation. On March 12, 1908, he picked his teeth with a straw from a dirty floor broom. On dislodging something from between the second and third right upper molars the straw broke and wounded the anterior pillar. He went immediately to a physician in the neighborhood who, seeing a most insignificant wound, assured him there was no need for alarm, there being slight pain and hemorrhage. He kept on at his work for the present without incident. On the third day after using the straw toothpick he noticed a peculiar feeling hard to describe located under the jaw and in the neck on the right side. Upon stooping down, lying down or pressure on the neck, a marked slowing of respiration was noticed; no fever. This embarrassment of respiration increased till at the end of a week the recumbent position was impossible. There was no swelling or other abnormal appearance in the throat or neck, at this time. He kept about his place of business, getting on fairly well, provided he wore a loose collar, remain upright and avoid stooping.

On awaking April 8th, 27 days after the initial injury, he was unable to open his mouth wide; having the usual symptoms of peritonsillar abscess, temperature 102° F. per os. Also marked edema of the uvula. All efforts at swallowing, in addition to the pain caused, so seriously embarrassed respiration he was told to refrain from the same. Amputation of the uvula seemed to have no effect toward relieving the distressed breathing. Making numerous incisions in the region of usual attack on this day, repeated the following day,

demonstrated without doubt the complete absence of a peritonsillar abscess. The bloodletting incident to these incisions seemed to give much relief from pain and some relief from the respiratory symptoms. The temperature slowly declined to the normal.

On the 13th, or five days thereafter, he suffered very little pain, swelling about the pillar had nearly disappeared. Respiration at this time much better; in fact, he could lie down for a short time at hourly intervals, a privilege he had not enjoyed for over three weeks prior to this time.

On the 14th, or the next day, or better still, 33 days after the toothpick wound, I was hurriedly summoned to see him. I found him sitting quietly in a Morris chair, his facial expression and other symptoms were those of an acute attack of asthma, except the respiration was quiet and noiseless, being 12 per minute. Temperature 100¼° F., per os., pulse 62. There was nothing abnormal to be seen in the throat or mouth except some swelling of the tongue. The nasal chambers were free. There was some swelling and fluctuation over the submaxillary region. Pressure over this region had the immediate effect of stopping respiration, which stoppage would not cease and breathing resume under half a minute.

He was taken to the Dixie Hospital, and preparations were at once begun for operation. At 1:30 o'clock, while the nurse was lightly scrubbing the jaw with a soft brush and a green soap solution, his breathing stopped, and in spite of all efforts, artificial respiration, lowered head, tongue traction, slapping chest with wet towel, etc., two and one-half minutes elapsed and patient seemed to be surely dead. Tickling the nasopharynx with a cotton sponge held in a pair of adenoid forceps caused the breathing to return (a point I gathered several years ago while administering anesthesia). As soon as breathing was fairly well established an incision was made through the skin down to the submaxillary gland, which was found to be broken down into a greenish pus of a horrible odor. The making of this incision caused another stoppage of respiration, the tongue being held forward by an assistant with a pair of forceps, was bitten so severely as to be more than half severed from a violent spasm of the jaw just at this juncture. After about a minute breathing was established by applying the same irritation to the nasopharynx, this time by means of

a cotton probe passed through the nose. A troublesome oozing hemorrhage ensued from the wounded tongue, which was checked by hot water. Strychnin and whiskey were given hypodermically, warmth to the extremities and continuously employing artificial respiration with an occasional tickling of the nasopharynx with the sponge held by curved forceps for the space of two hours, he could breathe ten times per minute without aid. The neck wound now being irrigated with hot saline solution, was packed with iodoform gauze. The packing caused another powerful spasm of the jaw, this time biting in two an old-fashioned hard rubber screw gag. Also a cessation of respiration for three minutes. Irritating the nasopharynx with a probe through the nose and slapping the chest with cold wet towels caused breathing to resume. Artificial respiration at intervals was practiced for two hours more, when he could breathe alone, respiration being 13 per minute. He regained consciousness at 6:30, being unconscious five hours. He was propped up in bed, a special nurse was put in charge, who watched his breathing closely, and at intervals of slow breathing tickled the nasopharynx with the sponge, held by curved forceps. It was four days before breathing was as much as 18 per minute. Temperature remained slightly subnormal during this time. A piece of the straw toothpick three-eighths of an inch long was found in the pus which came from the gland. Both wounds healed promptly and without incident. No anesthetic administered.

The case presents several points worthy of note:

1. There was undoubtedly a local neuritis of the vagus at some point below the superior cervical ganglion. The patient behaved as if the nerve was severed.

2. Spasm of the jaw due to irritation of the superior cervical ganglion, this ensuing even when the patient was in an unconscious state and in a state of profound depression.

3. Irritation applied to the nasopharynx re-established connection between the cortex and lungs, this temporarily mending the "wires," a point of value in treating shock from anesthesia.

L.

THE RESPIRATORY AND VOCAL SYMPTOMS IN PAPILLOMATA OF THE LARYNX.

By G. Hudson-Makuen, M. D.,

Philadelphia.

Papillomata of the larynx interfere with respiration and vocalization in two ways. First, they have an obstructive influence by diminishing the lumen of the larynx, and second, they interfere with the normal and delicate automatic action of the intrinsic musculature. The obstructive influence, as well as the influence arising from the interference with the muscle action, varies with the character and location of the tumors.

In order to appreciate fully the respiratory and vocal symptoms which arise from papillomata of the larynx, it may be well to recall for a moment some points with reference to the physiology of this organ. The problem, which nature seems to have solved so well, was to place the vocal bands within the respiratory tract in such a manner as not to encroach upon its lumen during ordinary respiration. This was done by the insertion of a group of muscles, whose automatic function it is to project themselves into that portion of the respiratory tract known as the larynx during phonation, and to modestly withdraw again during respiration.

In a sense, therefore, phonation may be regarded as an incident in respiration. It is, in fact, a modified or an elaborated form of respiration.

I have ventured elsewhere to define voice as a moving column of breath set in vibration by its own imapct with the vocal bands and reinforced by its diffusion through the various resonance chambers into the surrounding atmosphere. If this definition be a correct one, it is evident that anything which interferes with respiration must also interfere with vocalization.

A feature of the larynx, which is often overlooked in study-

ing the physiology of voice, is its function as a resonator. The vibrations imparted to the moving column of breath during voice production extend in both directions from the vibratory bodies, and the infraglottic as well as the supraglottic space becomes resonant with voice. Moreover, that the trachea, bronchi and bronchial tubes also share in this function may be demonstrated by simple auscultation.

Another feature of the larynx, which should be mentioned in this connection, is what some physiologists (among whom Czermac, I think, was the first) have called its double valvular action. This may be made to appear both in inspiration and expiration. It is well known that when the edges of the true vocal bands are approximated, their superior surfaces on either side of the rimaglottidis are slightly concave, and an attempt at inhalation will tend to keep the bands closed and prevent the influx of air. This forms the inspiratory valvular action of the larynx.

Moreover, it has been shown that the ventricular bands may be adducted while the vocal bands are in the position of abduction, and that an attempted expiratory blast, such as is used in phonation, taking place during this abduction of the ventricular bands, will tend to inflate the ventricles on either side and thus mechanically hold the bands in apposition, and the stronger the expiratory effort the tighter will be the apposition. This is called the expiratory valvular action of the larynx, and it is made use of to explain the physiology of coughing and certain spasmodic phenomena giving rise to defects of voice and speech.

Keeping in mind the various functions of the larynx which I have mentioned, we shall be in a position to understand more fully the respiratory and vocal symptoms which arise from interference with these and other functions by papillomata of the larynx.

RESPIRATION.

The respiratory function of the larynx is not noticeably interfered with by papillomata until the lumen of the larynx is encroached upon by the large size, the shape or the position of the growths, and it is surprising oftentimes to what extent these tumors may grow without appearing to obstruct the breathing, so great is the adaptability of the parts. On the other hand, a very small tumor may be so situated as to se-

riously impede breathing when the patient has a cold and is obliged to cough, or during certain changes in the position of the body. It is in the reclining position that difficulties in respiration usually first appear.

The respiratory symptoms are of gradual onset, and they are not often observed until some time after the vocal symptoms are well established. As the tumor increases in size the breathing becomes more and more difficult, and we all know that labored respiration is the most serious of all the symptoms, calling sometimes for prompt surgical interference. Coughing and choking at night may usher in an attack of dyspnea and, as someone has said, a child will often rise up in bed and stretch out his arms as if pleading for breath. The mechanism of this alarming dyspnea may best be explained on the principle of the valvular action of the larynx to which I have referred. The act of coughing closes the valves, and the combined pressure of the breath and tumor keeps them closed. A freely movable cauliflower-like growth is thrust up into one or both ventricles already inflated by air pressure, and the patient is unable to dislodge it. The valves will not open to admit air and the child becomes cyanotic.

VOCALIZATION.

The first symptom of papillomata of the larynx is generally some interference with vocalization, and this interference may be of any grade, all the way from a slight hoarseness to complete aphonia. The vocal symptoms also begin insidiously, and their origin may be attributed to other less serious conditions, such as enlarged faucial or pharyngeal tonsils.

Papillomata of the larynx in very young children may interfere with the development of speech by rendering vocalization difficult or even impossible, and when they appear before the age of two or three years attempts at speech result in little more than a hoarse whisper. The hoarseness in papilloma of the larynx, although not characteristic, differs somewhat from that in other tumors of this organ, because papillomata are generally more movable, and they have their origin in the mucous membrane, while other tumors invade the muscles, cartilages and joints of the larynx. The hoarseness in papillomata of the larynx, like the difficult breathing, varies at times with the rapid variations in the size, position and mobility of

the tumors, and there is a distinct effort in attempts at phonation which I think is quite characteristic. The vocalization at times is but little more than a whisper, with a moist, whistling sound. The absence of pain is another feature which distinguishes papillomata from other diseases of the larynx, and fever is also rarely found. Other clinical symptoms of papillomata of the larynx, their etiology, pathology and treatment, although exceedingly interesting, do not properly come within the scope of this paper.

LI.

SOME TUNING FORK TESTS WITH A SPECIAL AUSCULTATION TUBE.*

By L. M. Hubby, M. D.,

New York.

Barany has recently proposed a new method of making tuning fork tests. The examiner uses an auscultation tube the ends of which are snugly inserted in his own ear and the ear to be examined, while applying a sounding tuning fork to the mastoid process, to the auricle or to the auscultation tube with varying degrees of pressure, and comparing the intensity and duration of the notes as heard by the patient and the examiner. He claims the following advantages for the method:

1. Examination can be made in noisy surroundings.
2. Varying degrees of pressure of the tuning fork can not interfere. This is not true of the older methods of making the Rinné and Schwabach tests.
3. The exact point of application of the fork on the mastoid process is not of consequence. Of course, it is better to seek a point where there is maximum bone conduction when the tone is heard for only a short period by the patient.
4. Results are rapidly obtained.
5. Slightest impairment in air conduction is easily shown.
6. Diagnosis of internal ear involvement is possible when both middle and internal ear are diseased.
7. It is valuable in cases of simulation, as the examiner has constant control through his personal perception of the sounds.
8. Defective hearing of examiner is no obstacle, as the amount of this loss can be measured and due allowance made in the duration tests.

The following facts constitute the basis for the method:

1. The condition of the middle and internal ear of the patient is immaterial to the examiner during auscultation, wheth-

*Read before the Otological Section of the New York Academy of Medicine, April 8th, 1910.

er the sound of the tuning fork is conducted by the air, the cartilage or the bone.

2. A tuning fork applied to the mastoid process of a patient should be heard for an equal length of time and possibly a little longer by the patient than by the examiner during this auscultation.

3. Air, tube or cartilage conduction give approximately equal results except in a few instances.

Barany notes that in cases of small nonmarginal perforations of the ear drum the cartilage conduction is better than that through the tube.

Barany uses a tube supposedly the same length as that of the sound wave of a Politzer middle tuning fork pitched between d 576 V. and e 640 V.

His idea is that the intensity of the tone in the tube will then be equal at both ends, the tube acting as a resonator. This is impracticable for the following reasons:

1. Variations in temperature change the lengths of sound waves. Therefore tubes would have to be constructed for different temperatures.

2. The length of the external auditory canal and the depth at which the olivary bulb of tube can be inserted vary.

3. Changes in the rubber tubing due to stretching, etc., prevent any accurate permanent adjustment of the length of the air column.

4. It is desirable to use different forks. This would necessitate a tube for each fork. Moreover, in making application of the fork to the tube it would be necessary to apply it either at the end or exactly in the center, so as to be at the antinodes of the tone wave. I have therefore abandoned the idea of expecting the tube to act as a resonator.

I have found that if the combined air column in the tubes be, roughly speaking, less than a meter, that the bone conduction in a normal ear is markedly increased, but that for lengths greater than a meter the increase in bone conduction is very slight. It is therefore best to make the combined tubing a little over one meter.

The auscultation tube used by me consists of four rubber tubes joined together by a tubular cross, which permits free air communication between the four. The tube to the patient is one meter long and has a black olivary tip at one end for

insertion into the patient's ear. It is well to have several different sized tips to insure a good fit in exceptional ears. The tube to the examiner has a white olivary tip and is two-thirds of a meter in length. The third tube, 9 cm. long, goes to a 6 ounce valveless Politzer bag. This is used to test the proper insertion of the olivary plugs before proceeding to the fork tests, and for the compression and suction tests. The fourth tube, 9 cm. long, leads to an aneroid or mercurial manometer. In the ordinary tests it is detached from the manometer and closed with a thumb clamp. This thumb clamp can be placed on the tube to the examiner when it is wished to test the ear by compression and suction with the manometer alone. With a 6 ounce Politzer bag, compression or suction up to 40 mm. of mercury can be readily produced. It is generally useless to try to use higher pressures, as the olivary tips, even when well inserted, allow leakage at about 40 mm. of mercury pressure, unless held in place with the hand. The aneroid manometer attached to the Tycos sphygmomanometer is most convenient for the purpose.

I will now give you a short description of the tests.

AIR CONDUCTION TEST.

Insert olivary tips. Test whether these are tightly placed by gently pressing Politzer bag. If there is any leakage of air there is no movement of the examiner's drum, and the insertion of the tips must be corrected. Now apply a moderately sounding tuning fork to the mastoid process and then quickly to the auricle or to the auscultation tube, endeavoring to make the intensity of the tones as conveyed to your ear equal, by varying the degree of pressure of the fork at both places. If the patient under these conditions hears more intensely the tone by bone conduction there is impairment of air conduction. The test can be varied ad infinitum. Very slight impairment of air conduction can be demonstrated only with the lower tuning forks. When there is impairment of hearing and the result of the above test is negative, the internal ear, auditory nerve or centers must be the seat of the defect. The higher tuning forks, such as C^4 2048V, cannot be used on the tube, as the amplitude of the vibrations in the fork handle is not sufficient to set up sufficient vibrations in the tube. In marked unilateral affections of the internal ear, errors may result,

according to Barany, due to the normal bone conduction of the healthy ear giving the patient the impression of a relatively increased bone conduction in the diseased ear. This can be corrected by testing for the lower tone limit.

Another test for internal ear deafness is to compare the length of time that a tuning fork applied to the mastoid process is heard by the patient and the examiner. Fatigue of the auditory nerve is avoided by applying the fork intermittently. Barany states that in combined involvement of the middle and internal ear, occasionally the presence of the tube tip will reduce the length of time of bone conduction. This can be discovered by removing the tip as the tone perception disappears and noting whether the tone returns to the patient.

By means of the auscultation tube method a more exact Schwabach set of figures can be adduced, if desired. For by this method you need not start the fork vibrating with such great care and precision, since you use only the latter vibrations. Of course errors may occur if the tuning forks are made to vibrate for too short a period of time. The figures can be expressed as — or + normal. Thus, hearing of patient for

$$\text{C. 128 V.} \left(\frac{36 \text{ A. C.}}{18 \text{ B. C.}}\right) \text{ may be expressed } \frac{-6 \text{ A. C.}}{+2 \text{ B. C.}} \text{ or } \frac{30}{20}$$

Compression and suction tests for ossicular mobility can be most satisfactorily performed with this tube. The tests can be done with the tuning fork applied to the mastoid process, as suggested by Gellé, or to this auscultation tube at a point approximately equidistant from the ears of the patient and examiner. It takes very slight pressure, 2 to 5 mm., to produce a decrease in the tone perception in a normal individual. By means of the manometer the degree of rigidity can be expressed in mm. of mercury, and you will be able to follow more accurately the progress of the ankylosis.

LII.

ABDUCENS PARALYSIS AND OTITIS MEDIA PURULENTA.*

By Chas. E. Perkins, M. D.,

New York.

Abducens paralysis as a complication of otitis media purulenta, while somewhat rare, is of sufficient importance to occupy our attention. I will, therefore, relate briefly the histories of six cases, three of which I have personally treated, and draw some conclusions from the study of ninety-five, which have thus far been reported.

The first two cases were treated by me in Dr. Dench's service at the New York Eye and Ear Infirmary.

C. E., male, age 54, came into the hospital in June, 1908, with acute otitis media and mastoiditis on the left side, for which an operation was performed with normal recovery, except continuance of ear discharge. Early in November, 1908, following some intranasal operation, the right ear became affected and had been discharging several days when I saw him on November 13th. He had been suffering with a very severe pain in his head, especially marked in the frontal region and in the eye. The posteriosuperior wall of auditory canal was sagging somewhat. There was a small perforation in the membrana tympani. The discharge was very profuse. There was total absence of mastoid tenderness. Myringotomy performed. Slight improvement in the pain. On the 17th he had developed diplopia, and upon examination it was found that the patient could not abduct the right eye, but upon attempting to fix to the right, the left eye followed the finger, while the right stopped in the median position. Dr. Percy Fridenberg examined his eyes on the 18th and found the eyegrounds normal and diagnosed paralysis of the sixth nerve on right side.

Even in the absence of mastoid tenderness it was deemed best to operate, narrowing of the canal, the presence of great pain, the profuse discharge, and the possibility that the drainage was notwithstanding incomplete, determining this decision. So I performed the mastoid operation on the 18th of November and found a pneumatic bone, the cells congested, the antrum deeply placed, and bone in its vicinity softened and contained pus under some pressure. Dura in middle fossa, intentionally exposed, was aparently normal. There was complete relief from pain immediately after the operation. In four weeks, the first improvement in the paralysis was noticed, and recovery was complete in a little less than three months.

CASE 2.—William H., age 66, cabinet-maker, admitted to the New York Eye and Ear Infirmary, June 7th, 1909, gave history that about three months previously, following a cold, he suffered with pain in the right ear, which shortly thereafter began to discharge a yellow pus. The pain ceased in one week, but the discharge continued profuse for some time; then became scanty, accompanied by a severe pain in the ear and a dull headache on the whole right side. Patient had a subperiosteal abscess, and several days before coming to the hospital had noticed that he had diplopia when looking towards the right, which on examination was found to be due to paresis of the external rectus of right eye.

Mastoid operation showed subperiosteal abscess, perisinous abscess extending very deeply on the posterior surface of the petrous portion, from which location large quantities of pus welled up. Bacteriologic examination showed infection to be streptococcus capsulatus.

The horizontal semicircular canal was exposed and found to be normal in appearance. Recovery uneventful. The paresis of the abducens was found to be absent on the second day after operation, and there was no more diplopia. Eyes continued normal.

CASE 3.—Frank W., colored, age 33, came under my care in the New York Polyclinic Medical School and Hospital, on January 5th, 1910, with acute suppuration of the left ear, from which he had been suffering about ten days. There had been spontaneous rupture of the membrana tympani. The discharge was quite profuse. There was some pain in the ear

and a severe headache over the whole left side. He was put upon bichlorid irrigation. On January 9th he first noticed diplopia. I examined him on the 12th and found complete paralysis of the sixth nerve on the left side—the left eye could not be rotated beyond median position. Eyegrounds were normal. Absence of mastoid tenderness. Fundus of auditory canal narrowed. Discharge profuse. Hemicrania persisted. Admitted to the hospital and operation performed on January 15th.

I found the cortex very thick, the mastoid cellular congested and full of granulations. The antrum was situated deeply, and in its neighborhood the bone was much softened, a considerable quantity of pus under apparent tension welled up when this region was opened. The dura in the middle fossa was exposed over quite an area and seemed to present no great departure from normal condition.

Convalescence uneventful. The paralysis showed some improvement in two weeks, then remained stationary for one month, since which time it has improved rapidly until now, March 23d, movement of the eyeballs are normal and recovery complete.

The following cases occurred in the practice of Dr. Alfred Wiener of this city, and it is through his courtesy that I am able to report them.

Case 4.—Male, age 60, had acute otitis media of influenzal origin, myringotomy done on second day. Patient had severe headache on involved side—was not, however, localized in any special region. There was also vomiting. In the third week of the disease, paralysis of the sixth nerve with diplopia occurred. The eyegrounds were normal. Mastoid operation, performed soon after the appearance of the paralysis, revealed extensive disease of the bone, with much pus. Bacteriologic examination showed infection to be streptococcus capsulatus. Mastoid wound healed in about three months and abducens paralysis disappeared at the same time.

Case 5.—Male, age 52, acute otitis media with myringotomy on second day, followed by profuse discharge. Frontal and parietal pains of great severity. Abducens paralysis occurred in the third week, followed on succeeding day by herpes in auricular region of the same side—eyegrounds normal. Mastoid operation showed diseased bone and an epidural abscess

in the middle fossa. Pus contained staphylococci. Abducens paralysis improved slowly, and it was about six months before recovery was complete.

CASE 6.—This case is one that was treated by Dr. S. J. Kopetsky, and I report it from notes kindly furnished by him. Male, aged 32, had acute otitis media, following influenza with involvement of the maxillary antrum. Myringotomy was performed early. There were very severe pains in the frontal and parietal regions. Diplopia due to paresis of the external rectus developed about the fifth day. The mastoid was tender on pressure, and the external auditory canal narrowed at the fundus. Operation demonstrated that the bone was cellular and much softened. Perisinous abscess with copious evacuation of pus containing diplococcus intracellularis. Paresis disappeared on the third day, and the mastoid wound healed in two or three months.

The cause of the occurrence of abducens paralysis and the key to its solution will be found in the peculiar anatomic arrangement by which the sixth nerve gains its position in the outer wall of the cavernous sinus, and comes into relation with the ophthalmic division of the fifth, the fourth and the third cranial nerves, which it does immediately anterior to the first intracranial portion of the carotid artery. Anterior to this, there is no special reason why one of these nerves should be more frequently involved than the others. Posterior to this point, however, the sixth nerve is comparatively isolated and passes through a fibrous canal, called by Gradenigo "Dorello's canal," from the Italian anatomist who first described it.

There is considerable variation in different dissections of this region forms the internal boundary of Meckel's cave, cannot be considered in detail here. In all, however, the sixth nerve passes through this abducens canal, which begins where the nerve pierces the dura in the posterior fossa. In passing forward, it has the following relations: First, with the inferior petrosal sinus, which usually lies internal to it; then it passes beneath an osteofibrous bridge (to be described later), being bound to the bone in the region of the petrosphenoidal suture, and gains the posterior end of the cavernous sinus. Here it has the superior petrosal sinus above and the Gasserian ganglion externally separated only by the sinus wall, which in this region, which, although very interesting anatomically,

which contains the ganglion. It now passes through the cleft between the internal carotid artery and sinus wall, and then becomes associated with the other cranial nerves.

Arising from the posterior superior border of the petrous portion there is a spine which extends towards the posterior clinoid process. This is called the sphenoidal spine. It varies greatly in length and may be absent. Between it and the posterior clinoid process extends a thick fibrous band—the petrosphenoidal ligament. The length of these processes and this ligament mutually vary, but it is beneath the bridge, thus formed, that the inferior petrosal sinus joins the posterior end of the cavernous sinus, and the sixth nerve, lying external to it, has its most important relation to the temporal bone.

Now it is evident that narrowing of this canal may result from inflammatory thickening of its walls, or this thickening may arise from edema, caused by inflammation in the neighboring dura or bone. This narrowing, however produced, would result in pressure upon the nerve and abducens paralysis; or the inflammation may extend to the nerve itself, causing neuritis with consequent loss of function.

In the ninety-five cases collected, the cause of the abducens paralysis was ascertained with reasonable certainty in thirty-three; to be sinus thrombosis, two; meningitis, three; labyrinth disease, four; abscess in posterior fossa, nine; in middle fossa, two; osteitis, or disease of petrous tip, thirteen.

Sinus thrombosis was followed by abducens paralysis in two cases. One of these was reported by Bezold[50] and the other by Dr. John R. Page at the December meeting of this section, under the title "Thrombosis of the Jugular Bulb Without Apparent Involvement of the Lateral Sinus, Unusual Blood Count and Paralysis of the External Rectus Oculi." The patient, a female, age 30, had acute purulent otitis of the right ear. Myringotomy was performed on the second day. On the third day the temperature was 105°; mastoid operation, sinus exposed, seemed normal. Blood count: Leucocytes, 8,500; polynuclears, 62 per cent. Temperature varied between 99 and 105 degrees. On about the fifth day after the mastoid operation the sinus was explored, seemed normal, except that there was no return of blood from below. The jugular vein was resected. Two days later paralysis of sixth occurred and cleared up in four weeks. Dr. Page believes

that the inferior petrosal sinus was also involved, as after curetting the jugular bulb there was absolutely no return of blood, which could most easily be accounted for by assuming thrombosis of the inferior petrosal sinus. This would also account for the abducens paralysis, as we may assume the presence of inflammation or edema of the sinus wall, and hence pressure upon the sixth nerve, where it has a relation to it. It is very probable that simple lateral sinus thrombosis could not produce abducens paralysis per se, but only when the thrombosis had extended to the inferior or superior petrosal or cavernous sinuses.

Meningitis with route of infection unknown is given as a cause in three cases. This needs no special consideration, as it is easy to see how the sixth nerve could be involved, either from pressure caused by swelling of the abducens canal walls or neuritis, or involvement of the nerve as it lies on the dura in posterior fossa.

In 101 cases of otitic meningitis collected by me and analyzed with reference to symptoms, etc., paralysis of abducens was mentioned as a symptom in four cases. Extradural abscess in the posterior fossa occurred in nine cases. In some of these reports it was stated that the discharge of pus was profuse, and the abscess was known to have extended deeply along the posterior surface of the petrous portion, thus approaching the location at which the sixth nerve pierces the dura. Here edema or inflammation, slightly beyond the limits of the abscess, would result in narrowing of the abducens canal with interference with function of the nerve, or it may be stretched or compressed by the dural wall of the abscess cavity posterior to its entrance into this canal. It is certain that in some of these cases the injury to the nerve is slight and its effect evanescent, as in my case, in which recovery from the paresis was present two days after evacuation of the abscess, in Mann's[54] case, three days, and in Kopetsky's case, three days. When the extradural abscess is a small one it is not probable that it is a cause of the nerve trouble, but merely an incident of the inflammation of the temporal bone. Extradural abscess in middle fossa occurred in two cases. This would act in practically the same way, but in passing to the position of the sixth, the Gasserian ganglion would be encountered and produce symptoms. This occurred in one of

Wiener's cases where, in addition to an intense cephalalgia, which may reasonably be supposed to have been due to some interference with the Gasserian ganglion, there was also an eruption of herpes in the auricular region, the exact significance of which I believe is still under discussion.

We now come to that large group of cases in which the inflammatory process has extended through the bone itself to the vicinity of the nerve. That we have thirteen cases in which this is known to have taken place is a very significant fact, as I think it will readily be admitted that many other cases ending in resolution are of this type, as it is highly improbable that sinus thrombosis or epidural abscess would be overlooked. While inflammation could extend from the tympanum or mastoid through the diploe to the petrous tip, it is in bones of the cellular type that we should expect this to occur. The cells of various sizes with thin walls between form excellent paths for the passage of pus, especially if under pressure. Several different routes may be described by which the infection could reach the apex of the petrous portion:

(a) Sublabyrinthine route extending from the tympanum below the labyrinth and internal auditory meatus to the petrous tip. An interesting case in which the infection traveled this path is reported by Lombard.[3] Death occurred from meningitis. Autopsy showed pus in the tip cells with very pneumatic bone. On the healthy side, the cells in the petrous tip were very large, and mercury poured into them emerged in the middle ear. (b) From the mastoid antrum the infection may extend through the subarcuate fossa or petromastoid canal, which passes inward beneath the superior semicircular canal, and reach a layer of cells sometimes lying above the internal auditory meatus and thus arrive at the petrous tip, (c) or this point may be arrived at via the carotid canal, access to which is obtained either by eroding the bone on the anterior tympanic wall, or through one of the caroticotympanic foramina which give passage to the carotid branches of the tympanic plexus, or (d) finally the infection has been found in some autopsies to be through a layer of cells extending along the eustachian tube, thus passing from the tympanum to the petrous tip.

Anyone who has made many dissections of the temporal bone will readily see that this list of routes is only partial, and

that the variety and position of cells is endless. Of the thirteen cases of disease of the petrous tip, one (case of Goris') after operation, recovered, five were fatal from meningitis, autopsy proving that infection occurred from bone disease at apex, while seven were cases in which various complications in the neck occurred as a result of pus finding its way into the retro-pharyngeal space, or from swelling due to osteitis at the petrous tip.

If there was an epidural abscess in the middle fossa near the sixth nerve it would lie in immediate proximity to the foramen lacerum medium, and this passage would be its most natural way of exit. This would bring the pus into the retro-pharyngeal space. If the pus had existed in the bone and ruptured through its lower surface, it might reach the same location, provided its aperture of exit was sufficiently internal. More externally, it might follow the levator palati muscle to the lateral wall of the nasopharynx.

The remaining four cases which were known to have disease of the labyrinth are to be considered carefully, as those who advocate a reflex theory assume, I believe, that the non-acoustic labyrinth plays an important part in the causation of abducens paralysis. Two of these cases died of meningitis at the base, which was undoubtedly the cause of the paralysis. Another (case of Hastings[49]) had the labyrinth drained and resulted in cure in four weeks. This patient had severe facial neuralgia. The last (case of Alt[57]) had severe pain in the frontal region; had labyrinth opened and cure resulted, paralysis disappearing in nine days. In both of these cases the paralysis can more easily be accounted for by assuming some process in the neighborhood of the abducens canal as an osteitis of petrous apex, especially as this would also account for the severe pain in the face and forehead—symptoms which I am sure are far from common in labyrinthine disease, but, as we will soon see, are the rule in inflammatory processes at the petrous tip.

Intense headache, especially in the frontal region, severe pain in the eye or deep in the orbit, neuralgia of the fifth nerve, or paralysis of some of the muscles supplied by it, are symptoms, one or more of which have been noticed in fifty-five out of the ninety-five cases. This means that there is some interference with the Gasserian ganglion by the process going

on at the apex of the petrous portion. It was Gradenigo that first called attention to the severe frontal and parietal pains in this condition and interpreted their significance, and so this symptom, associated with otitis media purulenta and sixth nerve paralysis, is called Gradenigo's syndrome or triad. Out of fifty-one cases in which the condition of the fundus of the eyes were mentioned, changes were found in twenty-three.

Sex of patients: Male, 61; female, 24; not stated, 9.

Acute disease, 68; chronic, 17; not stated, 8. Cases have been classed as acute if under six months' duration.

The prognosis of these cases is always uncertain. Out of ninety-five cases, eleven died of meningitis, the infection occurring through the petrous tip, the labyrinth or other ways. Of the eighty-four remaining cases, recovery of abducens paralysis occurred in sixty-seven; probable recovery in five, partial in four, no improvement in one, not stated, six. We thus see that the prognosis of the paralysis itself is good.

Involvement of the sixth appeared after mastoid operation twenty-seven times; not stated, eight, and before any operative interference, sixty times. In this latter class, the operation was done in twenty-nine cases, resulting in twenty-seven cures, one death, and in one case the paralysis persisted. In the remaining thirty-one, in which the mastoid was not opened, there were four deaths, paralysis recovery partial in three, total in twenty-five. These statistics, I think, would tend to show that abducens paralysis is not, per se, an indication for operation. In some of these cases, the intense pain in the frontal region and other distributions of the fifth has been immediately relieved by opening the mastoid. This surely means that the process causing the neuralgia, viz., pressure upon the Gasserian ganglion, has been relieved by increased drainage through the mastoid and middle ear. That it takes some time for the sixth nerve paralysis to clear up does not mean that the disease process did not begin to improve at the time of and in consequence of the operation, but may be accounted for by assuming that pressure had so changed the condition of the nerve that time was necessary for it to become structurally capable of resuming its function. So, then, indication for operation would be intensity of the pain and the probability that drainage was not as complete as it should be. We should be more especially anxious about

this, as the increased pressure through insufficient drainage is acting not only upon the mastoid, which can easily be opened and relieved, but also upon the deeper parts of the petrous portion, which can only be reached with difficulty and menace to life. So the most conservative way to secure drainage would be through the mastoid in preference to performing repeated myringotomies.

The operation performed by Goris[44] and described at some length by Streit[65] shows us that the region of the petrous apex is not beyond surgical interference. In this procedure the roof of the external auditory canal and of the mastoid process are removed, and dura exposed to the superior semicircular canal. From this landmark over, the dura is separated from the bone and held away by spatulæ, and the tip curetted or the epidural abscess evacuated. Goris, in his case, found epidural abscess, and with curette removed a sequestrum from the petrous apex.

Abscesses in the pharynx, or neck, should be evacuated either by incision through the mouth or by an external route, according to their individual locations or preference of the operator. Incisions seem to be all these cases require, recovering quite promptly thereafter. In cases in which the swelling seemed to be mostly edema, multiple scarification effected a cure.

In conclusion, I would add that this article has dealt with abducens paralysis from the standpoint of the otologist and has necessarily been limited to a few of the problems of interest to him. A vast field of study has been opened up in the preparation of this paper, and it has been with difficulty that the author has kept himself within his prescribed bounds.

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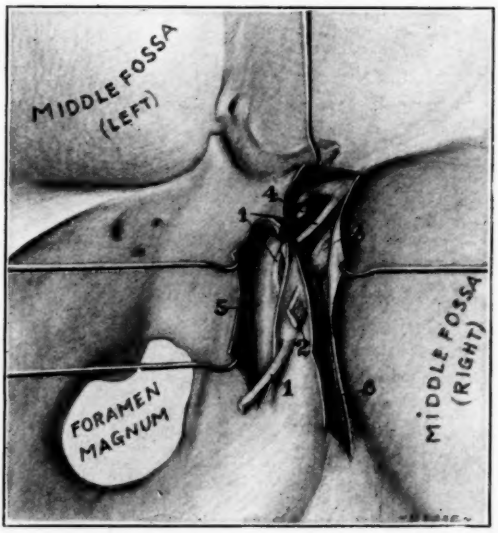

1, Sixth nerve. 2, Fifth nerve. 3, Gasserian ganglion on fifth nerve. 4, Internal carotid artery. 5, Inferior petrosal sinus. 6, Superior petrosal sinus. The petrous sphenoidal ligament is shown cut in the figure.

LIII.

ABSCESS OF THE LARYNX, WITH REPORT OF A CASE.

By J. S. Waterman, M. D.,

Brooklyn.

The case which I have the honor to report is that of a man, G. J., aged 42, Irish, barber, married. He came to me August 24, 1904, complaining of a slight sore throat, hoarseness and a dry, hacking cough.

Family History.—A brother and sister died of tuberculosis. Denies specific disease. Habits excellent. Not addicted to the use of alcohol or tobacco in excess.

Previous History.—One year ago he developed incipient tuberculosis at the left apex, examination of the sputum showing a few tubercle bacilli. From this condition he made a good recovery, under rational treatment, fresh air, rest and feeding.

Physical Examination.—Patient well nourished, somewhat anemic. Pulse 80; temperature 99.2°. Larynx slightly congested and red. Lungs normal, so far as physical examination could determine. Heart normal.

Treatment was outlined and patient told to return the next day, August 25th. Patient looked like a man who was seriously ill, and said that he felt sick. The larynx was very red and somewhat swollen. The cough was troublesome, with only slight expectoration. The following day there was some difficulty in breathing, the inspiration becoming stridulous in character. There was moderate pain on swallowing. The cough was constant, and the expectoration slightly offensive. Temperature 102°; pulse 110 to 120. Laryngeal examination showed considerable swelling of the arytenoids, aryepiglottic folds and ventricular bands. The whole larynx was intensely red.

Although a solution of adrenalin chloride was freely used,

with applications of ice over the larynx, and soothing inhalations, the swelling and edema in the larynx continued to increase with alarming rapidity, so that by ten o'clock in the evening preparations were made to do a tracheotomy. Instead of doing a tracheotomy, however, at 1 o'clock I freely scarified the swollen area, which resulted in giving the patient such pronounced relief that by half past two I was able to leave him in comparative comfort.

Immediately after the scarification the patient had a severe rigor, the temperature rising to 104, but promptly fell to 102 within the hour. The next day the larynx was much less red and less swollen. The cough was still troublesome, the expectoration very offensive and dark in color. The inspirations were stridulous in character and respirations labored.

On the fifth day the arytenoids showed as full, round masses, pale in color, and nearly filling the glottis. Dr. F. L. Tucker saw the case with me at this time. After deciding that we had to deal with a double abscess of the larynx, situated at the summit of each arytenoid, the larynx was cocainized and the abscesses were evacuated, each discharging a foul-smelling pus, similar in odor to the expectoration. The evacuation of the pus was followed by almost immediate relief from the dyspnea.

The local condition continued to improve, and the larynx had nearly approached the normal by the seventh day following the evacuation of the pus, excepting that the color was redder than normal, and the vocal cords were intensely congested.

On the fifth day after the opening of the abscesses, there was a slight dullness found over the right lower pulmonary lobe anteriorly. Over a small area there were numerous coarse moist rales. There was no pain in the chest, and no appreciable change from the normal in voice, breathing or vocal fremitus.

This condition had existed for several days, when the patient complained that, on coughing, a mass came into his throat and nearly strangled him. A careful examination showed a larynx which was red, but not swollen; and although a view was obtained below the cords, well into the trachea, there was nothing to be seen which could account for the strangling sensations. The following morning, after a violent

fit of coughing, the patient coughed up and expectorated a fleshy mass two inches long by three-quarters of an inch in thickness. This was examined by Dr. Jonathan Wright, who reported as follows: "Microscopically the mass consists of detritus granules, a few epithelial cells and a large number of elastic fibers. Stained for bacteria, there is dimly seen a large number of bacilli, but few cocci, and these not in chains." Subsequently, Dr. Wright suggested that the bacillus noted in the sections might have been the colon bacillus.

The patient gradually sank and died on the sixteenth day of his illness. After the second day of the illness the sputum assumed a brownish color, and a very offensive odor, increasing in offensiveness and in quantity to the end. The temperature ran from 89 to 102 degrees F., with the exception of one time, when it reached 104° following the rigor.

We have here a man who had entirely recovered from an incipient tuberculosis, but was much below par, apparently dying from a septic pulmonary lesion, the nature of the offending organism being uncertain.

He was in no condition physically to resist such an infection. Without the gangrene of the lung, there is no doubt in my mind that he would have recovered from the laryngeal condition, as that was practically finished when the pulmonary complication developed.

In looking over the literature of this subject I have found the terms used to classify it as: Infectious Interstitial Inflammation of the Larynx, Submucous Laryngitis, Phlegmonous Laryngitis, Suppuration of the Larynx, and Abscess of the Larynx. The latter term seems much the simpler, as it presupposes a submucous or interstitial inflammation, and includes all of the other conditions leading up to the abscess.

Morrell McKenzie defines abscess of the larynx as "A circumscribed collection of pus, due to inflammation of the soft tissues of the larynx, interfering with the vocal functions of that organ, and sometimes with the proper action of the epiglottis."

Grunwald speaks of an "infectious interstitial inflammation." An invasion by specific microorganisms, the streptococcus pyogenes, the various forms of staphylococci, the pneumococcus, and possibly the bacterium coli. These cases do not always terminate in abscess.

McKenzie reports thirteen cases of abscess of the larynx. In six, the abscess was situated at the base of the epiglottis. In four, it was in one of the ventricular bands. In three, it was in one of the aryepiglottic folds. Of these cases, nine were opened, and four burst. All recovered.

Richards, in the *American Journal of Medical Sciences,* 1890, reports one case, and collects twenty-four. Of these, six were at the base of the epiglottis, two were in the arytenoid eminence, three were in the aryepiglottic folds, one was in a ventricular band, three were in the vocal cords, six were subglottic, two were on the internal portion of the thyroid cartilage, and two were in the pyriform sinus.

Price Brown, in the *Medical Record,* 1893, reports two cases, one of which was subglottic, and one was at the base of epiglottis. He also found one case reported by Irsay, of Buda-Pest, in 1891. In this case the abscess was situated in the left arytenoid. He found one case reported by Milligan, of Manchester, in 1892, in which an abscess situated over the external surface of the thyroid ala, pointed internally to the laryngeal surface of the right side of the epiglottis.

LaFevre, in 1890, reported a case in which the abscess was situated at the base of the epiglottis on the right side. In this case operation was followed by recovery.

W. L. Culbert, in the transactions of the American Laryngological, Rhinological and Otological Society, reports a case of abscess, situated at the base of the epiglottis anteriorly. Operation was followed by recovery.

N. H. Pierce in the transactions of the American Laryngological Society, 1906, reports a case of "Primary Laryngeal Phlegmon" in a woman, involving first the right side of the larynx, extending from the base of the epiglottis downward. The left side became involved later. No operation was done; death occurred on the fifth day from profound sepsis.

The condition seems to be more frequent in males than in females and may occur at any age. Richards found one case at nine months and one at seventy-two years.

Grunwald says: "These cases are characterized by the sudden onset and rapid increase in symptoms. Dyspnea and suffocation in many cases set in early. In grave septic cases death sometimes occurs, from the extreme toxemia alone, before stenosis develops, as in Pierce's case. Sir Felix Semon,

in his address on "Acute Laryngitis" at the Polhemus Clinic, mentioned a number of cases which suggested the latter class.

Richards mentions a case of Berger's, in which after two days of slight sore throat intense dyspnea suddenly developed, death occurring that same evening. He also mentions a case of Dorning's, in a soldier, who, although complaining of a slight pain in the throat, went on parade at noon, and at five o'clock was dead. Abscess of the larynx was found on autopsy.

In adults the prognosis is good in those cases operated upon, bad in those upon whom no operation is done. While the cases of McKenzie's, which were not operated upon, recovered, nature doing the surgery, Richards found ten cases, reported as not operated upon, nine of which died; while of Price Brown's cases, the one upon which he operated recovered.

In children the prognosis is bad; five out of eight reported cases died.

From four to ten days seems to be the usual time for the abscess to form, and the course to recovery from ten days to two weeks.

There is no class of cases which requires closer attention, none which causes greater anxiety, and, I imagine, none which, recovering, would give the surgeon greater satisfaction.

This case seems to be the only one on record in which there were two separate abscesses in the larynx occurring at the same time.

Cases of laryngeal abscess, due to perichondritis, are not considered in this paper.

676 St. Marks Avenue.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

Meeting of April 8th, 1910.

DR. JOHN B. RAE, CHAIRMAN, PRESIDING.

PRESENTATION OF PATIENTS.

A Case of Abducens Paralysis Following Operation for Acute Mastoiditis Accompanied by Sinking Retropharyngeal Abscess.

DR. J. A. KENEFICK. The patient is a necktie maker by trade, 42 years of age, who presented himself at the New York Eye and Ear Infirmary on the 1st of October last, complaining of pain in the ear. He gave a history of having had a severe cold three weeks earlier and said that the ear condition followed the cold, which he claimed was an especially severe one. It was no doubt a case of otitis following influenza. On examination there was very little discharge in the canal, but on account of the headache of which the patient complained and the ear trouble, it was decided to keep him in the hospital under observation. It was also discovered that a private doctor had done a paracentesis, which, however, proved insufficient, and a proper myringotomy was performed. The case went on to an acute mastoiditis. There was sagging of the posterior superior wall, and the severe headache was a very prominent symptom throughout the case, both before and after operation.

The usual mastoid operation was performed, nothing remarkable being found, excepting that the mastoid process presented unusual pneumatic cells throughout, some of them extending into the zygoma. There was very little pus in the cells. After the operation the principal symptoms were the headache and paralysis of the external rectus muscle of the

corresponding side. The patient was dismissed from the wards and came to the outclinic to be dressed for some time, but finally there was noticed an unusual discharge of pus from the aditus over the surface of the wound, the volume of the discharge being greater than could be accounted for. This, together with the headache and the external rectus paralysis finally determined them to place him in the hospital for further observation; but he was very discontented there and anxious to be at home. He was discharged and readmitted on several occasions, according as his condition improved or otherwise.

About January, while his wound was still discharging and there was a large granulating area, he disappeared from the clinic, and there was much curiosity on the part of the staff as to what had become of him. It seemed probable that he had become dissatisfied with the treatment he was receiving and disliked being kept in the hospital for observation and hearing his case discussed. Finally Dr. Kenefick determined to discover what had become of the man, and the official investigator of the hospital was detailed to go to his home and find out about him. She reported that his sister was dressing the case at home, that he was apparently doing very well, and refused to come to the hospital; but that he spent most of his time on his back, complaining of the headache.

After an absence of ten weeks he reappeared at the hospital, with the wound apparently healed by the home treatment, but still complaining of headache, stiff neck and the external rectus paralysis. On examination it was found that he had very good reasons for carrying his neck twisted toward one side, as he did. He said that he saw double, which disturbed him very much, and complained of a hard and tender spot over the posterior surface of the mastoid region.

The man was induced to enter the hospital again, and an attempt was made to discover where the previous flow of pus had come from, but nothing was found excepting a few cells from the previous operation, which extended down beneath the occipital bone. The tip was removed completely. After this, the patient seemed to get on very well. He developed, however, difficulty in swallowing, and on examining his throat a retropharyngeal abscess was discovered, which he said had been present just before the second operation, but that it had

not troubled him seriously. A probe was passed up to the base of the skull. Since then he has had a free discharge from the sinus in the retropharyngeal space. His mastoid wound is healing nicely, and although he still complains of headache and stiffness of the muscles of his neck, yet he is apparently making a good recovery.

It would seem that the abscess in the retropharyngeal space has been a safety valve, which has prevented the gathering of an accumulation of pus at the base of the brain.

Abducens paralysis is interesting to otologists from the fact that this nerve, perhaps more than any other, at the base of the brain, is exposed to lesions from pressure and has a long course from its emergence to its muscle insertion—the longest of any cranial nerve. The point at which it was pressed upon in this case was about where it crosses, at the junction of the petrous tip of the pyramid with the sphenoid bone.

The detailed anatomy and the explanation of the pathology of these lesions will be presented by Dr. Perkins in his paper, to follow. It is well, however, for otologists to understand the track of this nerve. It was evidently an isolated lesion, for the abducens nerve of that side not only supplies the external rectus of its own side, but has nuclear connection with the internal rectus of the opposite side. Therefore it was plain the disturbance, being confined to the external rectus on this side, that the lesion was away from the origin of the nerve, on its way to the eye.

The posterior pharyngeal abscess had evidently proved to be the safety valve in this instance. The patient evidently possesses a cancellous temporal bone throughout. Its tip is anything but petrous, and the pus by disintegration easily passed to the tip, where it joins the body of the sphenoid. How it got down to the pharynx can be surmised; it would seem that there is no other way possible than that the pus sunk through the foramen lacerum medium, finding its way to the pharyngeal surface of the sphenoid bone and down the muscles of the neck and pharynx to a point which was favorable for exit. There must have been an escape of pus between the muscles of the neck, for from time to time there were certain spots which he pointed out as being tender.

Regarding the operative procedures for the relief of such a case, there is on record one case which was operated upon

and the tip of the petrous pyramid was reached, curetted and the patient recovered. This is the first case of the kind that Dr. Kenefick has encountered in a large clinical experience. He has never before seen one so rare and interesting. Upon looking up the literature and finding that Dr. Perkins had also looked up this class of cases, he found that it was the seventh of the kind on record of acute mastoiditis, paralysis abducens and sinking abscess of the neck.

DISCUSSION.

DR. WILSON said that if he understood correctly, some of these cases developed days after the operation, and he could not see how an abducens paralysis, due to pressure within the skull, would occur after the pressure had been removed by operation.

DR. GUTTMAN said that it was a most interesting case, so far as the abducens was concerned, but that he did not know why it should be considered a peculiar case in that the pus broke through the inner wall of the mastoid process and burrowed down into the deeper layers of the neck, forming the so-called Bezold mastoiditis. If the case was considered especially from this point of view, then it was not rare.

DR. JOHNSON said that there was a difference in this case and the cases so commonly seen extending through the posterior wall of the mastoid and opening in the neck from the inside of the mastoid tip. The interesting point in this case is the fact of its opening behind the pharyngeal muscles, probably, as suggested, through the foramen lacerum. It is not common for cases of mastoid disease with cerebral muscular involvement to open there. He would like to know whether there were ocular examinations made, further than to observe the movements, and whether there was any indication of cerebral pressure. If a sufficient amount of pus accumulated to affect the abducens nerve it would seem that there must have been pressure, and possibly that might have been indicated in the fundus. He was not inclined to believe that a diseased mastoid could open from the posterior tip and reach the pharyngeal space.

DR. KENEFICK replied that the eyes were examined from time to time, but no additional disturbance was found—no symptoms whatever of internal pressure. He himself felt com-

pletely in the dark as to just how this condition occurred, but the way he had suggested seemed to be the most likely—the foramen lacerum medium being closed with a very thin plate of cartilage, it could easily be pierced by a disintegrating stream of pus, and then the journey down to the retro-pharyngeal space would be simple. The question had been raised as to why there were not other symptoms besides the peculiarly isolated symptom of abducens paralysis, but there were none. There was no aphasia.

DR. WILSON exhibited the end of a

Gold Wire Eustachian Bougie Measuring 2 cm. Long Which Had Broken Off in the Eustachian Tube.

four years previously.

It was one-half centimeter from the end of the tube, and all means failed to remove it. He had devised an instrument to be pushed through the catheter and grasp the end of the wire, but it was of no avail.

It apparently did no harm, so he left it there, keeping the patient under observation. About six weeks ago he noticed the wire was approaching the pharynx, and day before yesterday the patient spat it out. When the wire became visible it was distinctly seen with the pharyngoscope, but no attempt was made to remove it, as it was working toward the pharynx. Dr. Wilson mentioned this case for two reasons: First, the danger of the wire breaking in the tube. It might have done considerable damage, but fortunately it did not, and second, it is remarkable that the wire should have remained stationary in the tube for so long a time. This patient has been catheterized regularly, and he could always feel the wire with a bougie. There was no difficulty in inflating his middle ear.

DISCUSSION.

DR. FOWLER said that this case showed very forcibly the ability of the eustachian tube to drain from its distal end, and how much more easy it is for matter to pass toward the pharynx than to the outer end of the tube.

DR. BERENS inquired what effect the presence of the wire had on the hearing, and also what effect was produced on the patency of the tube, to both of which questions Dr. Wilson

responded, "None whatever." Dr. Berens then remarked that the doctor was very fortunate in receiving such a kind letter from the patient. He himself, a few years ago, had received a letter from a patient asking whether he did not consider that he was guilty of a case of criminal negligence. He had lost a piece of wire in a patient's tube. He replied that he did not consider it a case of criminal negligence, because he did not wish to subject the patient to a disagreeable operation; and furthermore, that he did not consider that the wire would do any harm, but that it would later drop out of itself, as it did—and this closed the incident. In another instance, however, the wire did not come out for a year and a half, but it did no harm. In the second case, though, the hearing was very much improved—both by the patient's evidence and his own record.

Dr. Kenefick regretted that he had not heard Dr. Wilson's first remarks about the case reported, and inquired what was the position of the tip of the bougie when it broke off. Was it in the tympanic cavity, on its way in, or out?

Dr. Wilson replied that it was short of the tympanic cavity and broke off on the way out.

Dr. Kenefick replied that this gave him the impression that the bougie was one of those first put on the market, made from gold-plated wire. It always had a tendency to get into a coil, and was very liable to be affected by the electric current. He has done a great deal of electrolysis of the eustachian tube, and has not had this accident, but felt uneasy about it every time he did it.

Paper: Some Tuning Fork Tests With a Special Auscultation Tube.*

By Lester Mead Hubby, M D.

DISCUSSION.

Dr. Fowler said that he had been much interested in Dr. Hubby's paper, as two years ago, while working out his tests for the differential diagnosis of ossicular ankyloses, he had necessarily familiarized himself with acoustic laws and phenomena, and experimented with tuning forks along lines very similar to those bearing upon Dr. Hubby's subject. In order

*See page 688.

to understand the tests proposed by Barany, we must constantly keep in mind several fundamental laws bearing upon the physics of sound production, transmission and perception. There are so many conflicting elements which enter into tests such as those under discussion that it is not always easy to determine which is the fundamental and deciding factor in the results obtained. Briefly, the following facts must not be lost sight of:

The intensity of sound varies inversely as the square of the distance from its source. This does not hold true if the sound is confined in tubes, for in this case diffusion is largely prevented.

Intensity depends upon the density of the air in which a sound is generated and not upon that of the air in which it is heard.

Intensity diminishes and increases with the diminution or increase in the density of the air, and is proportional to the square of the maximum velocity and to the square of the amplitude of vibration.

Velocity is directly proportional to the square root of the elasticity of the air through which sound travels, and inversely proportional to the square root of the density of the air.

Velocity, therefore, depends upon the elasticity and the density of the medium of transmission; but as density and elasticity of air vary in the same proportion and act differently, no change in velocity occurs if the temperature remains unchanged.

In closed tubes, heated air will therefore increase the velocity. In free air increased density will diminish the velocity.

Velocity is markedly affected by the loudness of a sound—in direct proportion to its intensity.

Velocity is greater in solids than in air, because the elasticities of the former are vastly greater in relation to their densities than is the elasticity of air in relation to its density.

There are many more facts which have a direct bearing on the subject, but these cannot be entered into in this discussion.

Dr. Fowler said that his experience with the tests described is not sufficient to enable him to definitely give an opinion concerning them, but he had for several hours rehearsed the tests, and found that for the lower forks the bone conduction

was greatly prolonged. This was well brought out by his own method of using twin tuning forks. The air conduction seems also to be increased for the lower forks, but this is probably not actually so, for if the nontested ear be closed while the test is being carried out, an accentuation in sounds is at once apparent. This could be so only if the sound is coming to the tested ear largely by bone conduction by way of the tubal walls and the cartilaginous and bony meatuses.

It is plain that in placing a vibrating tuning fork on the rubber tubing, we transmit the vibration of the fork to the tubing, and it is therefore by means of the oscillations of the tubal walls that the enclosed air is set into motion. This accounts for the fact which Dr. Hubby mentioned, namely, that higher forks cannot be used. The reason is that these forks are furnished with shanks so heavy that the vibrations are not transmitted to the tubing with sufficient force. This can be remedied in part by suitably constructed tuning forks and tubing.

It is apparent, then, that for the Schwabach tests we are introducing new factors, and whereas Barany's tests may prove most useful it cannot be said that we are really by them doing Schwabach or, for that matter, Rinné. Likewise Gellé by this method is changed and a new test is actually applied. Time will show if it is an improvement over the older methods.

Dr. Fowler expressed his indebtedness to Dr. Hubby for so clearly demonstrating these new tests of Barany and his own modifications thereof.

Dr. Hubby said that he had nothing to add, except that a great many theoretical conditions might be thought to influence the results, but practically this did not occur. The tests appear to work out well. According to Barany's idea, under ordinary conditions the air, tube and cartilage conduction are equal. The variations in elasticity, density and the loss by heat production in the compression tests practically balanced each other. He has taken the closed tube by itself, applied to this vibrating forks and listened with the stethoscope while the contained air was condensed or rarified and was able to detect no change in the intensity of the sound.

In regard to the old methods of obtaining the Schwabach figures, he has found them unreliable, but with this method he thinks you can get very accurate results.

Paper: Abducens Paralysis With Otitis Media Purulenta.*

By Charles E. Perkins, M. D.

DISCUSSION.

Dr. Louis Fischer said that he had enjoyed the paper very much indeed, and that it had opened up an idea for him which he intended to follow out, but that he could not at the time discuss such a paper.

Dr. Kenefick said that he was confident all the members felt indebted to Dr. Perkins for the complete and masterly fashion in which he had dealt with this important subject. Those who have been impressed by Gradenigo's triad will not forget it and would recognize it when encountered. He had heard Dr. Perkins give his statistics in regard to osteitis at the tip of the temporal bone, and feels more than ever impressed that this was the process by which the abducens nerve was paralyzed in the case which he had reported this evening. He is also impressed with the fact that individuals who have these cellular temporal bones are especially prone to be afflicted with acute mastoiditis, and to present the Gradenigo triad so well described by Dr. Perkins.

Dr. Perkins, in closing the discussion, said that in the paper he had stated that in some of these cases there had evidently been pressure, which had been relieved by operation. He did not claim that the pressure existed in all cases; simply because the mastoid operation is done is no reason why there should not be inflammation further on. Every one who does operations on the temporal bone comes at times to some places where he does not dare curette further. The process is really outside of operative interference, i. e., through the bone itself, and in many cases of abducens paralysis the cells are inflamed at the petrous apex and produce this condition. We look for the place where the process will affect the sixth nerve and produce the intense neuralgia. That directs our attention to this spot, and there is no use hunting elsewhere. This accounts for all the symptoms, and when we get a diagnosis which accounts for all the symptoms we are on the right track. There are, however, many points about it still unsettled.

*See page 692.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

Meeting of May 13th, 1910.

DR. JOHN B. RAE, CHAIRMAN, PRESIDING.

PRESENTATION OF PATIENTS.

Cases of Chronic Middle Ear Suppuration Cured by Obliteration of the Eustachian Tube: Demonstration of Instruments.

DR. SIDNEY YANKAUER. Some time ago I demonstrated to this section a set of eustachian sounds with a scale painted around the shank, by means of which the distance to which they are introduced can be accurately measured. I wish now to add to these instruments a set of olive-pointed bougies for diagnostic purposes, and an applicator, for making applications to the interior of the tube as far as the middle ear. The applicator consists of a wire made of a double strand of very fine wire twisted together. The end of the wire has the form of a small loop, so that it is smooth and round. The wire is contained in a handle upon which the same scale is marked as is marked on the bougies and sounds. The wire is wound with a tuft of cotton in a manner similar to a nasal applicator, but instead of leaving the end of the cotton soft and fluffy, it is bent over the end of the wire, cut off close, and rounded off between the fingers, so that the cotton protects the end of the wire, but can not double upon itself when introduced into the tube. By means of this applicator applications of cocain, adrenalin, argyrol, etc., may be made to the entire interior of the tube. Applications of cocain are used for diagnostic purposes, and applications of argyrol have been found to be of benefit in the treatment of chronic catarrhal otitis, especially when the applications are made well beyond the isthmus, in the narrow bony part of the canal, where the slightest amount of swelling causes considerable obstruction in these cases.

I have been able to demonstrate upon the cadaver that the isthmus of the tube may be reached through the external

auditory canal by means of an instrument having the proper curvature. I present here a section of a cadaver which shows the external auditory canal, the middle ear and the eustachian tube. The section is in a plane which is curved, with the concavity of the curve outward and forward. In this curved plane the auditory passage describes a curve with the concavity downwards and outwards. An instrument, such as a probe, may be passed through the external canal and into the tube as far as the isthmus. (A probe was shown lying in the auditory passage, its end lying just beyond the isthmus.)

Having ascertained this fact, a number of instruments were constructed for the treatment of the isthmus. The first of these is a knife, called the salpingotome, which has the required curvature, and which can be passed through an incision made in the anterior part of the drum membrane, into the isthmus, for the purpose of cutting a stricture of the tube at the isthmus, an operation which was performed successfully in one case.

I have also a set of curettes for the purpose of curetting the isthmus in order to produce an organic atresia of the isthmus for the cure of chronic suppurative otitis. They consist of an appropriately curved shank, surmounted by a mushroom-shaped head. They are passed into the tube through the external auditory canal, and by manipulating the instrument the mucous membrane is removed from the neighborhood of the isthmus. When there is a fairly large tube, the mucous membrane can be everted, so that its end shows in the middle ear.

Following this operation there is a reaction consisting of an edema of the inner tympanic wall accompanied by a serous transudation. This lasts two weeks, after which the mucous membrane becomes dry; it loses the moist glistening appearance of mucous membrane and becomes dry as skin, as in the ears that have been shown here to-night.

I have also observed that the perforation in the drum membrane will never close after the tube has been obliterated at the isthmus, but will become larger.

An interesting series of cases which has just been begun is the result of these observations on chronic suppuration. If the suppuration will cease after closing the tube, it must also be possible to prevent it by the same means. Hence, in a

few cases of otosclerosis in which the hearing was improved by making a preliminary perforation in the drum membrane, I have removed the entire drum and the malleus and closed the tube. The operation was followed by the same reaction as in the cases of suppuration, and after the reaction had passed off and the inner tympanic wall had become dry, it was found that the patients had not only retained the amount of improved hearing which followed the preliminary perforation, but that they had made additional gains since; in one case, after a year, the improvement seems to be still going on. These patients, of course, hear through their round window.

CASE HISTORIES.

Case 1.—Female, 42 years old, came under my care five years ago, stating that her left ear had been discharging since an attack of measles when she was three years old. For some time there had been distinct odor, and white, cheesy masses began to appear in the secretion.

Upon examination a large perforation was found, involving the upper half of the drum membrane; the ossicles had disappeared from the attic, which was filled with cholesteatomatous masses; there was a small granuloma in the anterior part. The lower half of the drum membrane was adherent to the promontory, and a small portion of the hammer handle was attached to it. Radical operation was refused. Under local treatment, including the removal of the granuloma, and of the small piece of the hammer handle, the odor disappeared, but the suppuration and the discharge of cholesteatoma continued, the quantity varying from time to time.

On August 28, 1907, the ear was operated upon. The lower part of the drum membrane was separated from the promontory with an angular knife, and the region of the eustachian tube exposed. A small quantity of pus was found in the mouth of the tube. After cleansing the ear as thoroughly as possible, the tube was curetted, the ear dusted with iodoform powder, and the canal filled with gauze. On the following day the inner tympanic wall was found swollen and slightly reddened; the discharge in the ear consisted of thin seropurulent fluid containing small masses of cholesteatoma. The swelling of the inner tympanic wall lasted two weeks; during this time there was very little secretion, and the ear was

treated with insufflations of boric acid powder. After this the patient used instillations of alcohol, and was not seen again until October, when there was still some discharge, but it no longer contained cholesteatoma. In January, 1908, the ear had become quite dry and clean, the inner tympanic wall having the dry appearance of skin. The adhesion between the drum membrane and the promontory had not recurred; the edge of the drum had retracted so that the entire middle ear cavity was freeely exposed.

No treatment of any kind has beeen required since then, and upon examining the ear to-night it is found to be entirely healed.

Case 2.—Female, 27 years old, states that her left ear had been discharging since childhood from causes unknown to her. The discharge was usually abundant, and occasionally there was an odor. The drum membrane had nearly disappeared, but the remnants of the ossicles were still present. A small polyp, as large as a pea, was attached to the malleus near the short process. The polyp was removed, but it developed again in a few days. On July 24th, 1909, under local anesthesia, the ossicles, together with the outer attic wall, were removed, the tube curetted and the ear dusted with iodoform powder. The following day the inner tympanic wall was swollen and reddened, and there was a thin mucous discharge in the ear. The swelling of the inner tympanic wall lasted about ten days, when it receded, and the ear became dry; it has remained so since, as can be seen to-night.

Cases 3 and 4.—Female, aged 15, states that at the age of two years double paracentesis was performed during an attack of acute illness; following this there has been a constant profuse discharge from both ears, often accompanied by odor, which was not alleviated by local treatment at various clinics.

Examination showed profuse purulent discharge in both ears; both drum membranes had disappeared, but the ossicles were present on both sides. On the right side there was a polyp of moderate size, filling about three-quarters of the lumen of the canal.

On October 8th, 1908, the polyp was removed from the right ear and the tube curetted. On the following day the

inner tympanic wall was swollen and somewhat red, and there was a thin mucous discharge, but no pus. The remains of the polyp was touched with 10 per cent. nitrate of silver twice a week.

On November 9th, 1908, the left ear was similarly operated upon.

The polyp on the right side disappeared completely after two months, but both ears continued to secrete turbid mucus until April 19, 1909, when both ears became dry. They have remained so since, and now have the dry appearance of skin.

Case 5.—Elsa H., 30 years old, states that her left ear has been discharging since childhood. The ear was neglected until about five years ago, when she came under the care of a competent otologist. Radical operation having been refused, she was put upon conservative treatment, which resulted in diminishing the amount of discharge, especially during the warm weather. In the winter the discharge was always profuse and purulent. The hearing was considerably diminished, whisper being heard at four inches. Examination showed that the upper half of the drum membrane had disappeared, but the remains of the ossicles were still present. The lower part of the drum membrane had become adherent to the promontory; anteriorly, this adhesion terminated in a small opening, by which the space underneath communicated with the middle ear proper, while posteriorly the adhesion extended as far as the aditus ad antrum. A bougie passed through the eustachian tube could be seen under the adherent membrane.

On November 8, 1909, the ear was operated upon. The adhesion was severed by an incision extending along its entire length. A small amount of pus escaped. This was wiped away, especially in the region of the round window, when it was found that the hearing distance had improved so that whisper could now be heard at a distance of six feet. The tube was curetted, the ear dusted with iodoform, and packed. On the following day the inner tympanic wall was swollen, there was a discharge of thin mucopurulent secretion in the middle ear. This reaction persisted for three weeks, when the swelling had completely subsided and the ear had become dry, and has remained dry since, as can be seen by inspecting her ear to-night. The adhesion in the lower half of the

drum has returned. The edges of the incision have completely retracted, so that the hypotympanum is freely exposed. The gain in the hearing which was made at the time of the operation has been maintained up to the present time. It is interesting to note that this patient has since passed through an acute inflammation of the antrum of Highmore on the same side, which healed without operation, without affecting the ear in any way.

Case 6.—Anna S., 21 years old, states that her left ear has been discharging since early childhood, the secretion being very profuse and often of foul odor.

Examination showed purulent secretion and complete disappearance of drum membrane and ossicles. The tube was curetted in the manner described, on January 17, 1908. The discharge became very much lessened after the operation, and on the 11th of February, 1908, had almost ceased. The patient was not seen after this date until February 5, 1910, when she stated that her ear had remained free from discharge for two months, after which it became as abundant as before the operation, and has continued so ever since.

Examination showed that a cicatricial drum membrane had formed, which nearly closed the middle ear cavity, the opening in the membrane being about as large as the head of a pin. On testing the tube by filling the ear with sterile water and inflating air through the eustachian catheter, it was found that the tube was open.

A second operation was therefore performed on the tube on February 14, 1910, but the cicatricial drum membrane was not incised, nor was the opening in it dilated. The reaction which followed was the same as had occurred in the other cases, the discharge being changed to a clear mucous discharge.

On February 21, 1910, the swelling of the inner tympanic wall had subsided, and the opening in the cicatricial drum membrane had become considerably larger. On February 28 the opening measured 5 mm. in diameter, about three times its original size. The patient has been seen since that time once a week. There is at these times only a minimum amount of discharge, although no treatment is carried out by the patient. The ear is dusted with iodoform powder weekly. By inspecting the ear to-night, it can be seen that the opening in

the cicatricial membrane has become so large that all that remains of the membrane is a narrow band around the walls of the canal.

DISCUSSION.

DR. HARRIS said that he had been much interested in what he had known of Dr. Yankauer's work, and that he deserved the greatest amount of credit for the ingenuity shown, the time expended, and the labor put into it. The results shown speak for themselves, and if these findings are confirmed they will revolutionize our work on the middle ear. He himself has always felt that the eustachian tube has not been treated scientifically, that our bougies have been working in the dark, and that more delicate technic would effect better results. It had never, however, entered into his head to make any such treatment as Dr. Yankauer had suggested, through the tympanic cavity. It is generally held that in suppurative cases, where the radical operation is done, it is important to shut off the eustachian tube. This is undoubtedly correct, and he is justified from that in proceeding as he has done, and he should continue the work he has begun. This report to-night is only preliminary, and he will no doubt later publish in full what he has done. He has armed himself on the anatomy and physiology to prove the wisdom of what he is doing, and while the speaker is not yet fully convinced along the lines of otosclerosis, he is convinced that in these cases of suppuration there is a tremendous deal in what has been done. He concluded by congratulating Dr. Yankauer most heartily.

DR. FRIDENBERG said that the entire matter is new and opens up such a wide field that he did not feel competent to criticize, but that he would like to ask a few questions, especially in regard to nasopharyngeal conditions. Dr. Yankauer had spoken of a mucopurulent discharge, and he would like to know whether this was a condition extending from the pharynx, or a genuine tympanic infection. Many of the cases of chronic running ears are propagated otitis. There is sometimes a slim otitis without any aural discharge, and sometimes the ear begins to run and continues a long time, the secretion becomes fetid from decomposition and defective drainage, and secondary infection takes place and may simulate a pure

suppurative condition. He also wishes to know if there was any suspicion of tuberculosis in any of the cases. If one can weed out a certain percentage of cases which are limited to the attic and middle ear, and thus avoid the necessity of a radical operation, it will be a great gain. As to the technic, a very fine touch would be required, and much practical work would have to be done on the cadaver before sufficient skill and accuracy could be acquired with the instruments, especially the knife. The nasopharynx itself and the eustachian tube undoubtedly require treatment in a large proportion of cases of otitis. If we can exclude bone disease and wish to stop the infection from the eustachian tube, it is a question whether this is best accomplished by artificial obliteration. Local treatment by astringents applied to the lumen of the tube and its pharyngeal ostium and operative treatment of adenoids and postnasal anomalies undoubtedly cure many cases. It remains to be seen whether we can with impunity obliterate a canal which is of such importance for the ventilation of the middle ear and for the function of hearing.

Dr. Kopetzky said that he had had no actual experience with the method of treatment advanced by Dr. Yankauer. He had classified cases of suppurating ears into those in which the bone was diseased, and those wherein the lesion resided in the mucous membrane of the nasopharynx and eustachian tube. Some years ago it had occurred to him to attack the chronic suppurating ears in the second named group of cases, by applying treatment to the tube, and eventually stopping it up, but as his experiments progressed, he found that a similar method of treatment had already been published abroad. The tube in the book referred to is treated by inserting suppositories into the tube through a eustachian catheter. The idea underlying Dr. Yankauer's work is a distinct advance along similar lines, and he is to be congratulated upon his achievements. We should not, however, forget in those cases of middle ear disease where there is a bone lesion, necrosis, etc., that it is illogical to expect a cure of the bone lesion by any method which closes the eustachian tube and leaves the diseased bone in situ. Where the lesion is locacted in the mucous membrane and in the nasopharynx, and no bone lesion exists, then to expect a cure is logical and in line with the pathology, as we understand it, in these cases. We know

that it is the failure to procure closure of the tube which is the underlying factor in the failures to get dry ears, when we operate radically in this same class of cases. Furthermore, Dr. Yankauer has not shown why it is more easily possible to close the tube by his method than it is when the patient is upon the operating table and we are attempting the procedure during the technical steps of the radical mastoid operation. Dr. Kopetzky thought the same difficulties would be encountered, and in the same percentage of cases it would be found that the tube reopened.

Dr. Wilson said that the method was certainly worthy of trial, and that it would require considerable skill of manipulation, but he believed that every aurist would soon be able to acquire the necessary facility. The case that had impressed him especially was the one with cholesteatoma. There the bone was diseased, and it seemed to him that the only way a cure could be accounted for was by the shutting off of the suppuration and allowing the air to attack the cavity. If such a case as that can be cured by this procedure it is a vast advance over any treatment we have yet had.

Dr. Kenefick expressed his regret that he had not arrived in time to hear all of Dr. Yankauer's presentation of this subject, but from what he had heard two conditions had suggested themselves, in which Dr. Yankauer's method would be of great benefit. The previous speakers had referred to cases of persisting suppurative otitis, but he had in mind cases where he had done an ossiculectomy in which he has been able from time to time to heal up the processes and get the ear in perfectly good condition—only to have it reinfected soon after from the nasopharynx by way of the tube. In such cases Dr. Yankauer's method of closing the tube would be an ideal procedure for establishing a permanent cure. The other condition was in certain cases where the radical operation has been performed and the fundus has apparently become dermatized, but so rapidly that there is a suspicion of space behind it, which, if it had been kept aseptic, would have granulated in, but the rule is that this skin becomes infected from the tube, and this ideal healing is destroyed by a suppurating sinus. Under these two conditions it would seem that Dr. Yankauer's method would bring about ideal results.

Dr. Harris said that Dr. Kopetzky had given a division of

the forms of suppuration, which is more or less a classic one, but that Dr. Yankauer had shown in his suppurative cases—as had also Dr. Nagle in that remarkable series reported in Washington, 39 out of 40 cases which she cured by vaccine treatment—that there is a question whether our pathology is correct. There were forty well recognized cases, studied not merely by her but by others; while it is true that possibly an accredited aurist had not seen them, yet all these cases were cured in a remarkably short time, some after only three or four injections. It is hard to say that they were all tympanic, and not any with bone necrosis. Certainly she was not trying to deceive, but took them as they came. As Dr. Wilson pointed out, cholesteatoma is a bone disease, so it is a question of whether our pathology is correct. Dr. Kopetzky's conclusions that Dr. Yankauer's work appears to be indicated only in cases of tympanotubal disease is hardly warranted; there is more in it than that; there is encouragement for cases where there is distinct involvement of the bone itself.

Dr. Kopetzky said that he had no desire to detract an iota from Dr. Yankauer's achievements, but that he had merely tried to call attention to what appeared to him to be limitations for the employment of the procedure, for it was a fact that many good procedures eventually fell into disuse because they were not applied logically. Regarding the paper of Dr. Nagle to which Dr. Harris had referred and upon which he based his opinion that a revision of our knowledge of ear pathology was impending—he informed the section that the paper in question was open to serious question, because no exact otologic diagnosis has been made in the cases Dr. Nagle reported, and therefore the keystone of the arch was missing, and our pathology can stand in the face of this report.

Regarding the case of cholesteatoma which Dr. Yankauer reported as among the cases which he cured, he wished to impress the fact that cholesteatoma was not a bone lesion. It is a new ingrowth of epithelium; the destructive process that we see in the bone is the result of the growth of this epithelial mass—the result of pressure and bone absorption—an osteitis rarificans. When you remove from a small cholesteatomatous mass its supply of moisture and permit the air to have access to it, it will be found to disintegrate into dry epithelium and can be shaken out. In the case to which Dr. Wilson called

attention this is what was done, and hence the good result. In such a case the procedure seems to be logically applied also. Finally he thought that in selected cases, applying the procedure where it seemed logically indicated, we might expect uniformly good results. Neither the advocated procedure nor the reports on vaccine therapy at hand have up to now given anything upon which we may justify a statement that our pathology is wrong. Dr. Kopetzky has started investigations as to the action of vaccine therapy in cases of clearly diagnosed bone lesions in the middle ear and adnexa, and said that as yet he has seen no good result from their use in such cases.

DR. YANKAUER, replying to the question as to the manner in which this form of treatment works, said it is his belief that a large percentage of the cases of chronic suppuration have a profuse discharge, not because the secretion has formed in the middle ear, but because the patients are blowing their noses through their ears—they are ejecting nasopharyngeal mucus through the tube into the ear, and thus maintain a constant infection and keep up any disease process that may exist in the ear. In the cases he had operated on, quite a number had polypi, and there were a number in which distinct areas of necrosis could be felt with the probe, and several cholesteatoma cases. Polypi cases were treated with nitrate of silver—for an aural polyp is merely an exuberant granulation. A few of the cases had no evidence of bone involvement, and they healed rapidly; the discharge never returned after the tube was closed; the ears became dry and have not discharged since. Where polypi were present it took a longer time—weeks, or months, perhaps. The history of one case which had not been present to-night illustrates better than the others the course of such a case. The patient was a young woman of twenty, with a chronic suppuration in her left ear. On examination a large polyp was found in the bottom of the canal, which obscured the view of the middle ear. It was attached to the posterior part of the promontory; the eustachian tube was closed by an adhesion of the drum membrane to the promontory. The adhesion was incised, the probe passed into the tube, and the floor was found to be necrotic, the necrosis extending along the floor of the middle ear almost to the posterior wall. This necrotic bone was curetted carefully and the

tube was closed. The polyp was treated with applications of nitrate of silver. In four to six weeks the polyp had shrunken to a little nodule on the promontory, but the suppuration had not ceased. Examination showed a black mass in the attic, which was tender to the probe, and which was thought to be a necrotic or gangrenous incus. The patient refused operative interference, and accordingly it was left alone. One day, several months later, the patient had a blood-tinged discharge which lasted for a day, and the next day this mass had disappeared, and the probe could be moved about freely. After this, which seems to have been a spontaneous discharge of the incus, the suppuration diminished rapidly and only a small crust was left on the outer attic wall. The crust reappeared in a few days and was again removed. The last crust was removed in January of this year. She has been seen since, and it has not recurred. She is apparently completely cured. It is interesting to note that the point on the promontory from which the polyp grew has been converted into a depression. The vertigo from which she suffered has disappeared, the hearing has been good and has remained so.

In regard to the question of ossiculectomy: A few years ago a symposium was held on this subject in the Otologic Section of the American Medical Association, and the consensus of opinion was that ossiculectomy does not cure the suppuration. Dr. Yankauer said that he has seen several cases where it was apparently cured, but that he had never seen the inner tympanic wall dry up, as it does after closing the tube. He had purposely omitted ossiculectomy, and the inner tympanic wall had dried up in spite of the fact that the ossicles remained; in the cases in which they were removed, there was evidence of distinct necrosis, so that in these cases the ossiculectomy unquestionably expedited the healing.

As to the technic, this will be fully described in an article which will appear later. At present he would only say that the auricle must not be drawn up and back, as is done in examining the ear, until the end of the instrument is in the middle ear. The instrument is then guided into the orifice, and it will find its way into the tube. He first practiced this introduction by means of a probe, and advised that it be practiced in this way until the feel is acquired; curettement is done by the sense of touch. The manipulation of the instrument is performed

as follows: After the curette is introduced the handle is depressed or raised in various directions, and by a sort of circular motion the mucous membrane of the tube is incised all around the tube; then by an in-and-out movement the mucous membrane is separated, and the instrument is withdrawn; in some cases the mucous membrane can be everted, but not always; the isthmus is not always smooth and round, but it is often angular, in which case the mucous membrane will tear, so that only shreds will be brought out. The shape of the isthmus can be ascertained before operation by the use of the eustachian applicator, allowing it to remain for a few moments in the isthmus; when the applicator is withdrawn the cotton tuft will assume the shape of the isthmus. In curetting the tube at the radical operation the mucous membrane is curetted only on the floor; the instrument does not curette all around, and on the floor of the tube, especially toward the tympanum, there are a number of irregularities, often quite deep. All of this has to be curetted away in order to insure closure of the tube; the curetting at that point is rather dangerous on account of the carotid artery; but it would seem impossible to injure the carotid artery with these instruments, for if the largest one is used the instrument is held in position by the walls of the tube and cannot plunge through; the shape of the head is also so formed that it would be difficult to go through except in case of a very large dehiscence; the projection of the head from the shank is not more than a quarter of a millimeter, and that is not greater than the thickness of the mucous membrane.

A Case of Mastoiditis With Atresia of the External Auditory Canal and Persistent Middle Ear Discharge. Unusual Operation and Recovery of Hearing.

Dr. John R. Page. Eight months ago this patient suffered from a severe streptococcus cellulitis, which began in her external auditory canal, and later involved the whole side of her face and neck to such an extent that her life was endangered. After the cellulitis had subsided the walls of the canal still lay in apposition, and the drum membrane could only with difficulty be seen through a very narrow speculum. In spite of her having no recollection of any previous ear trouble, a perforation was discovered in the drum membrane, through which a very foul discharge continued for two months or

more. A piece of gauze had to be kept in the canal to afford an escape for it, as ordinarily the swollen walls completely occluded the canal. Mastoidectomy was performed, with the radical operation in view, but as the middle ear, ossicles, and attic were not extensively involved, the effort was made to save them. The tip and bone throughout the mastoid were removed to the inner plate, and the posterior wall of the canal was cut down almost to the annulus. Because of the marked atresia of the canal, its walls had to be split and folded back and a new meatus cut. This afforded room for drainage of the cavity, so the posterior incision was closed.

Dr. Hopkins has followed a similar procedure in cases where no atresia existed, and there has been some discussion as to whether his operation is entirely justified in such cases. It is satisfactory to note in this case that there is no deformity and that the hearing is excellent, the canal being no longer occluded. The middle ear is dry, and the drum membrane is intact.

Case 2.—The next case is of interest only to show a satisfactory result where there was a total atresia of the external auditory meatus for over a year, resulting from a stab wound. Bone conduction was very good, but there was practically no air conduction except for very loud sounds. After the auricle had been brought forward from a posterior incision and the cartilaginous canal had been cut through transversely, a wide canal and a good membrane were discovered. The atresia extended inward from the meatus for a short distance only. This part of the canal was excised, a new meatus was cut in the concha, and the posterior incision was closed. Air conduction is now better than bone conduction, and his hearing for watch is 30/40; for whisper, 25 feet plus. Both of these cases were taken from Dr. Duel's clinic at the Manhattan Eye, Ear and Throat Hospital.

Brain Abscess Simulated by Acute Suppurative Otitis Media Complicated With Acute Polioencephalitis and Myelitis.

Acute Labyrinthitis Simulated by Inflammation of Geniculate Ganglion and Herpes Auris.

Dr. John McCoy. These two cases are presented because of the interesting association of diseases. The first patient is a little girl five years of age. She applied for treat-

ment on the 8th of February with a history that two weeks before she had developed a severe pain the right ear, followed by discharge the next day. The ear was irrigated and discharged for a week, when it ceased, then the child became increasingly drowsy; by the end of the second week she was quite lethargic and noticed nothing about her. She was also noticed to walk with a limp and finally refused to walk at all. She then developed a paralysis in the left arm and leg. When first seen she was in this condition, and the ear discharge had reasserted itself the previous day. On examination, the drum was found to be edematous and swollen, with a drop of pus in the bottom of the canal; temperature 102°, pulse 68. The child had been vomiting, apparently of the projectile type, for past 48 hours. She was in a condition of profound lethargy. When roused, she would notice things, and even talk, but wanted to sleep all the time. She was brought to the doctor, with the diagnosis of possible cerebral infection, following acute infection of the right ear. She was sent to the hospital for observation and the drum was incised that afternoon. She remained in a drowsy, stuporous condition all that night, but was seen to move the left foot and also the fingers and lower part of the hand spontaneously the next morning.

The possibility of a combination of anterior poliomyelitis associated with ear disease then suggested itself. That night she was brighter, and the next day she was seen in consultation with Dr. Hunt, who said that the condition was not only anterior poliomyelitis, but polioencephalitis also. He gave a hopeful prognosis, which was borne out, and the condition cleared up, the child leaving the hospital five days later, bright and active, with the paralysis in a clearing condition.

The other case occurred in a child five and one-half years old, who was brought to the office with the history that one month earlier he had for two weeks complained of earache. He had been taken to a local doctor, who prescribed some drops, but no discharge was seen for two weeks. The earache was not continuous; he would go to sleep and wake up with it, and then would sleep and not complain of pain until the next day. At the end of two weeks there was a slight discharge; some matter which they did not call pus, but described as a discharge of thin material, which lasted for three days and then ceased. Four days later the youngster in trying to get

up was noticed to fall over, and on trying to walk he fell over to the right side. He was then taken to the family doctor, who referred him to a neurologist. The neurologist decided that there was no symptom of cerebral lesion, and referred the case to Dr. McCoy with the idea that there had been a suppuration in the middle ear that had extended to the internal ear and set up a labyrinthitis.

When Dr. McCoy examined him he walked to the right side, his temperature was normal; the drum was slightly congested, the hearing was nearly normal, there was no spontaneous nystagmus, and on testing his vestibular apparatus by the caloric turning tests, it was found to be normal. There was an apparent labyrinthine irritation without labyrinthine involvement. There were a number of vesicles in the ear, and this, with the fact that the internal ear was acting normally, suggested an inflammation of the geniculate ganglion, producing reflex irritation of labyrinth, also producing herpes.

The child was put to bed and kept quiet, and at the end of three weeks, without other treatment, he was normal and able to walk perfectly, and showed no further disturbance.

Case of Objective Tinnitus Aurium.

Dr. David G. Yates. The patient is a married woman, thirty years of age, of a nervous temperament. Three months ago she was suddenly attacked with a loud roaring tinnitus, one-sided, which has never left her since. During the past three weeks it has been rather worse. The sound can be plainly heard by others. It can be stopped by light pressure upon the soft tissues behind the angle of the jaw and by turning or bending the patient's head toward the affected side. This is the only way in which she can obtain relief. The sound is described as similar to the preliminary scraping of a phonograph. The eustachian tubes are open.

The patient had an acute suppuration in both ears eleven years ago, but the hearing is normal, or nearly so, when the tinnitus is suspended by pressure. There is no other history bearing upon the present condition. The patient is exceedingly nervous and easily excited; the pulse is 120, and the eyes slightly prominent, almost suggesting exophthalmic goitre. The case is presented in the hope that some suggestions for treatment may be offered.

DISCUSSION.

DR. HARRIS said that the case was an exceedingly interesting one and that he had never before heard anything like it. It was quite different from the usual cases of objective tinnitus, and he had no explanation to offer. A very interesting case had been shown by Dr. Alderton at the New York Otological Society a year ago, in which there was a clicking sound that was more or less under the control of the will, and was apparently associated with the tensor tympani muscle. The girl could apparently interrupt it at her pleasure. In the earlier part of the day he had listened to one of the worst cases he had ever heard, a case of which some of the Mount Sinai men might know—a woman with a very pronounced aneurysmal bruit directly behind the ear. Dr. Elsberg had operated upon it, using the usual mastoid incision, but signally failed in securing relief. Deep pressure in that case would stop the sound; deep pressure in the place where in Dr. Yates' patient light pressure will stop the noise. A fourth case which he recalled was one that Dr. Kenefick saw, where the occipital artery was the cause, and where the man who had charge of the case was contemplating operation.

DR. FRIDENBERG said that it was his impression that this condition was of vascular origin; the tinnitus has a peculiar rattling character, and pressure on the carotid stopped it instantly; it is not subject to the patient's will at all, so any action of the muscles can be excluded. There are some interesting points about the patient's condition, especially the prominent eyes, and he would like to know if the heart has been examined. She has a rather bounding, rapid pulse.

DR, YATES stated that the heart had been examined, and the patient's pulse was 120.

DR. FRIDENBERG said that if the sound annoyed her very much he would suggest that a mild compression, if kept up, might relieve her. This pressure it was evident could be so slight as to cause no marked congestion or other embarrassment. The peculiar character of the tinnitus, which closely resembles a coarse, moist bronchial rale, and the fact that it disappears for a time after Valsalva, suggest a rather curious etiology, viz., that this rattle takes place inside the eustachian tube, and is caused by mucus in the lumen and by alternate contact and separation of the walls of the tube, or perhaps, mere displace-

ment of the mucus by the transmitted pulse wave from the carotid. A dehiscence in the roof of the carotid canal would explain the transmission of the mechanical pulse wave.

Dr. Kenefick said that an interesting point was the fact that it began only three months ago. He agreed with Dr. Fridenberg that an inquiry into the patient's general condition would be very valuable. She certainly has an exophthalmia, and it should be determined whether these are related conditions. There was no doubt of its vascular origin.

Dr. Yates said that he had examined the patient very carefully, and beyond what he had already stated he had found that the noise is stopped momentarily by autoinflation of the middle ear by the method of Valsalva. She has been helped by bromide, which seems to have greatly decreased the noise, and altogether she is much more comfortable than she has been.

A Case of Erysipelas Following Mastoidectomy, Treated With Hiss' Leucocyte Extract.

Dr. Rae submitted a chart for the purpose of placing on record the treatment of a case of erysipelas, following the mastoid operation, by the leucocyte extract of Hiss.

The patient, Miss S., underwent a simple mastoid operation at 8:30 p. m. on Saturday, April 2nd. The following day the temperature rose to 103.4°. The outer dressings were removed and a small amount of white edema around the wound was observed. Next morning the temperature had reached 105°, and distinct evidence of erysipelas was present. A complete dressing was done, the iodoform packing being replaced by plain gauze. The erysipelatous area was dressed with ichthyol-vaseline, and large doses of tinct. ferri perchlor. were given internally.

The same afternoon treatment with the Hiss extract was started. Each dose consisted of 10 cc. of the serum. Two injections were made the first day, and three on each of the succeeding days, at the hours noted in detail on the chart. The temperature during these days ranged between 104.8° and 105.8°. The erysipelas extended over the whole scalp, as low as the clavicles in front, and gradually faded out about the level of the low edge of the scapulæ behind.

It would be absurd to attempt to draw any conclusions from

this one case. It does not appear that the extract exerted any influence on the temperature, but it is worthy of note that throughout the entire duration of this intense cellular inflammation the sutures held, the wound remained clean, and has since pursued a normal course toward recovery. Although most cases of erysipelas complicating the mastoid operation recover, still its occurrence in a patient of fifty-five years, with a temperature for four days in the neighborhood of 105°, must, of necessity, be a source of grave anxiety. This patient withstood the disease excellently. She was not aware that she was critically ill, was mentally clear throughout, and needed no stimulation. It therefore seems but fair to attribute to the Hiss extract the credit of enabling the patient to combat the disease, even if no specific effect can be claimed for it.

DISCUSSION.

DR. MCCULLAGH said that within the last week he had a case of erysipelas, developing a week or two after a frontal sinus and ethmoid operation. The patient, a woman, was older than Dr. Rae's patient, and the Hiss extract seemed to have a very good effect on the erysipelas; the patient is still under observation. As he understands, this is a routine treatment in Dr. Lambert's service, in Bellevue Hospital, for erysipelas. Dr. Hiss had stated to him that the results he had obtained with the serum treatment in erysipelas, when taken early, were certain and rapid, the cases clearing up in twenty-four to forty-eight hours.

DR. KOPETZKY said that he had nothing to add to the history presented; but, in regard to the effect of the Hiss treatment on the temperature, cited a case which is just clearing up after a postoperative sinus thrombosis. The patient had a very high temperature and nothing seemed effective in reducing it, until the Hiss serum was tried, and with every injection there was a distinct drop in the temperature. In another case, the pulse rate came down, and the child seemed to be rested for the time being, as though it had had a good meal. The treatment seemed to be of assistance in the course of the septic diseases.

In reply to an inquiry from Dr. Harris as to what his opinion on this subject was, Dr. Rae said that he thought it helped the patient to fight the disease. The extract having been

administered early, it is impossible to say what would have been the course of the disease had it been withheld. For this reason only can no opinion be offered, as far as this case is concerned, as to the effect of the extract on the temperature, but the reported experiences of others seem to indicate that the higher temperatures are reduced by its administration.

DR. PAGE said that he recently had a case of sinus thrombosis and perisinus abscess in which the jugular vein above the entrance of the facial was entirely collapsed, the sinus itself containing fluid pus. After the excision of the vein and the usual operation on the sinus, the patient was put on Hiss' extract and did unusually well, there being no reaction from the operation in spite of the temperature of 104 that preceded it. Dr. Dwyer administered Hiss' extract for a week, during which the temperature was not higher than 101. It was then discontinued for a day, and the temperature immediately went up to 103.5. This was probably a coincidence, but it was nevertheless a fact, so Hiss' extract was again administered for a few days and the temperature remained down.

DR. KENEFICK said that apparently we have in this extract an agent which will be of great use in cases of mastoiditis developing erysipelas. It is very hard for such patients to be sent away; if we can provide for them in our own hospitals and put them on the Hiss extract it will be a distinct advantage.

NEW YORK OTOLOGICAL SOCIETY.

Stated Meeting, March 22, 1910.

JAMES F. MCKERNON, M. D., PRESIDENT, IN THE CHAIR.

Mastoiditis.

DR. F. T. HOPKINS presented three patients upon whom he had operated for mastoiditis, closing the posterior wound absolutely at the time of operation, thus materially shortening the period of healing. The wound is drained through the external auditory meatus, and healing takes place in the canal itself. The hearing is practically the same as in the other ear. The only objection to the operation is that of deformity, the external meatus being somewhat larger than normal. Healing takes place in from four to six weeks, which is a distinct advantage in many cases.

DISCUSSION.

DR. DENCH, referring to the question of disfigurement, said that while the meatus is larger in cases operated upon by the method under discussion, unless one looked for it, the deformity would not be noticed. The length of time it is necessary to wear a bandage, or even a pad, is important. The earlier the bandage can be removed the earlier will the patient, in many instances, be able to return to work. He had been very favorably impressed by the method.

DR. GRUENING did not consider the retention of hearing a point in favor of the operation under discussion. With the old mastoid operation the hearing is not ordinarily affected, nor is it expected to be affected. He believes in a large wound and thorough drainage. The disfigurement caused for three or four weeks by the bandage in the old operation is inconsequent, compared with the permanent disfigurement produced by this new method. The advantages of the shorter healing do not counterbalance this permanent disfigurement. Should there be additional areas of necrosis they cannot be reached so readily as by the open wound. While the cases

presented were shown as good results, he would rather consider them failures because of the unnecessary disfigurement. A scar behind the ear is not objectionable, but a large canal, particularly in a young girl, is certainly to be so considered.

DR. DENCH said he was skeptical concerning this operation when he read Oscar Wolf's description of it long ago, but since seeing it, as performed by Dr. Hopkins, he had changed his opinion. The time of healing is undoubtedly greatly diminished, which is a distinct advantage, especially in those who have to return to work early, as it obviates the necessity of wearing the bandage and the consequent disfigurement.

DR. PHILLIPS believed the only possible advantage of the method under discussion to be the shortening of the time of healing the external wound. Over against this is the deformity, which is a very material disadvantage.

DR. DENCH said that it had been his practice to remove the entire tip in all cases of acute mastoiditis. Sometimes a pretty deep scar resulted. The lack of scarring in Dr. Hopkins' method depends upon placing the depression on the inside rather than on the outside.

DR. H. A. ALDERTON called attention to the fact that the amount of deformity in the ordinary mastoid operation is lessened if the entire tip is removed. The tendency to sink in is not so great when this is done.

DR. GRUENING, referring again to the disfigurement, said the scar behind the ear depends upon the nature of the mastoiditis. If it is necessary to remove much bone the scar will be just as deep as in other cases.

DR. HOPKINS, replying to a question by Dr. Gruening, said he had performed the operation in fifteen cases. All did well except two. One of these did not do so well, because the posterior wound was injected with adrenalin solution for the purpose of controlling the bleeding, and as a consequence the wound broke down, so that healing did not take place in the usual satisfactory manner. In the other case the dressing was done by the house surgeon. The posterior wound broke down, the healing was very unsatisfactory in its progress, but the result was good. The hearing was exceedingly good in each case.

DR. MCKERNON asked how much, proportionately, of the posterior wall is taken away; also whether, in making the flap,

it is split, one part being carried above and the other below.

DR. GRUENING thought better drainage could be obtained by splitting the canal, just as is done in the radical operation.

DR. HOPKINS said that middle ear drainage is better in these cases than where the ordinary mastoid operation is performed. Drainage through the aditus is perfect and can be observed. The canal being large, better drainage can be secured than in most cases in which the canal wall sags, shutting off the membrana tympani from view, so that it cannot be examined carefully, and preventing perfect drainage through the canal. In the first week or two following the ordinary mastoid operation there is a large amount of pus in the middle ear, which it is hard to drain.

Modified Noise Producer.

DR. PHILLIPS exhibited a modified noise producer consisting of an ordinary telephone receiver attached to a faradic coil. The sound is conducted through rubber tubing to glass ear tips. The current supplied may be obtained either from dry battery cells or the street current, controlled by a suitable rheostat.

Tinnitus.

DR. MAX TOEPLITZ reported two cases of peculiar tinnitus. The first, a man, thirty-five years of age, was sent to him as an ear case. When he examined the left ear, in which the patient complained of the trouble, he found it perfectly normal. The man described the trouble as "hammering in the ear." His heart was examined and found to have a mitral lesion, which was probably the cause of the "hammering" in the ear, the only symptom of which he complained. The second case was a woman, fifty-one years of age, who complained of noise in the left ear, which was like a constant roaring day and night. The ear in this case was found to be almost normal. All the tests with tuning forks gave normal results, also Galton's whistle. Hearing for the whisper was somewhat lowered. When asked about the noise the patient said, "You can hear it if you will place your ear to mine." This was true, the roaring noise could be heard. By pressing the finger upon the tip of the mastoid, on the anterior surface, the noise disappeared. Behind and below the mastoid a distinct pulsation could be felt. The patient had been examined by a neurolo-

gist and had been admitted to Mount Sinai Hospital for operation for aneurism of the occipital artery. The operation was performed the day before (March 21) by Dr. Elsberg. The occipital artery was found very much enlarged and was removed.

It was first suggested to the patient that she have made an instrument similar to that employed for the retention of a hernia, to be pressed upon the place where the pulsation was felt. It was afterwards decided that it would be wiser to operate. The speaker knew of no case reported in the literature in which the artery produced a noise which could be heard outside the ear, and where it could be heard by the examiner.

DISCUSSION.

DR. GRUENING asked whether compression upon the carotid would stop the noise. The question was answered in the negative. Dr. Gruening then continued the discussion. Arteriovenous aneurism occurs in the head more frequently than might be imagined. It is a symptom known to ophthalmologists. The internal carotid as it passes through the cavernous sinus communicates with the sinus, giving rise to these noises. Compression of the common carotid generally stops the noise.

DR. DENCH called attention to the fact that a sudden twist of the head may cause compression upon arteries, which will give rise to tinnitus, which is synchronous with the heart beat.

DR. ALDERTON called attention to a similar case, which he reported some time ago, and which is still under observation. The noise will disappear and then return, and can be heard in either ear. It is not due to aneurism. He cited another case, a young woman, referred to him by Dr. Butler, of Brooklyn. The girl had been under considerable strain, and Dr. Butler thought the condition due to vasomotor disturbances. If the first patient's head is turned so that she cannot contract the muscles of the neck and throat the noise will disappear. When she gets the muscles under control again the noise is again heard.

DR. DENCH referred to two cases reported by Professor Halsted, of Baltimore, in which tinnitus was caused by dilatation in the carotid ventricle. Cases due to dilatation or aneurism of the vertebral artery are common.

DR. HARRIS said that while the case presented by Dr. Toeplitz is unique and the only one on record where the noise was audible to the examiner, with involvement of the occipital artery, he recalled a case where the noise could be controlled by pressure upon the artery. No operation was undertaken in this case.

DR. TOEPLITZ, closing the discussion, said he had thought of jugular aneurism, as suggested by Dr. Gruening, and had thought of ligating it. Six years ago the woman had had a distinct attack of vertigo, which occurred suddenly, at night, and which lasted for six weeks, during which time she was in bed. She was unable to raise her head. She had had no further trouble until five weeks ago. The test was made for nystagmus. He could not say whether there was a lesion in the labyrinth.

DR. DENCH reported a case of

Destructive Process in the Mastoid, Giving Rise to a Very Few Symptoms.

The patient, a boy, was brought into the New York Eye and Ear Infirmary with a history of earache eight days before. There was slight tenderness, with a suspicion of fullness behind the ear. Contrary to the usual practice, he opened the mastoid at once. The sinus was found to be rather superficial, and behind and over it was an epidural abscess of considerable size. The patient was doing well. Dr. Dench emphasized the importance of making a distinction between cases in which there has been spontaneous perforation or those where drainage has been effected by myringotomy and such cases as the one reported, in which there had been no middle ear drainage. Where an acute middle ear infection has existed for eight days any damage in the mastoid has already been done, and any operation upon the middle ear will simply mask the symptoms. In such cases, with the slightest indication of mastoid involvement, he would open the mastoid. If drainage has resulted from spontaneous opening or from myringotomy he would wait a little longer.

DISCUSSION.

DR. GRUENING suggested that the symptoms might subside and the mastoid involvement continue.

DR. HARRIS considered the question of the most advantageous time to operate in acute mastoiditis a very difficult one to decide in many instances. In the presence of typical symptoms one may safely proceed, but in difficult cases, such as those reported by Dr. Dench and Dr. Lewis, it is not so easy to determine the wise course to pursue. Where the perforation, if there has been one, has healed, with possibly a little redness of Schrapnell's membrane, perhaps marked mastoid tenderness, when the case is first seen, and perhaps a history of a discharge from the ear lasting a few hours, there is doubt as to what is best to be done. He cited a case in a young girl, who reported very severe pain in the ear, lasting twenty-four or forty-eight hours, then disappearing. In this case the drum membrane looked normal when he first examined her. There was slight injection along the manubrium, and there was distinct pain upon pressure upon the antrum. There was a difference of opinion among those who examined her. Operation was delayed. The tenderness over the mastoid very rapidly disappeared, and in three days, without any treatment whatever, entirely ceased. There was no sagging of the canal and nothing to point to middle ear trouble.

DR. DENCH had previously reported three cases similar to the one mentioned by Dr. Harris. In all of these cases there was haziness of the drum membrane, which was not true in Dr. Harris' case. The speaker had seen mastoiditis develop six weeks after first examining the case, and when it was under observation, once or twice a week in the interim, the only evidence of mastoiditis being the posterior swelling. One cannot be too careful in these cases. A certain number of cases of meningitis of unexplained origin will later be found to be due to mastoid involvement traveling inward toward the meninges instead of outward. He had reported a case in which infection had laid dormant in the mastoid for three months. The man in this instance had been in perfect health for three months after an acute attack, and had sought advice on account of his hearing. Cases of this kind form a distinct class.

DR. LUTZ mentioned in this connection a case of acute mastoiditis which had apparently cleared up. The patient disappeared for some time, and when he returned for treatment the only symptom of which he complained was pain, which

began the night before. There was no swelling and no discharge. The mastoid was opened and found to be extensively involved.

Temporosphenoidal Abscess.

DR. SEYMOUR OPPENHEIMER reported an unfortunate case accompanied by many peculiar features. The patient, a young girl, twenty-two years old, was first seen by him the middle of last December. She was then suffering from acute mastoiditis of the right side. The preceding history was not particularly interesting, and the operation presented nothing unusual. A large pneumatic mastoid was found, with extensive destruction in the interior. A small area of bone over the roof of the tympanum was destroyed. A very small area of dura was exposed. It was necessary during the ten days the patient was in the hospital to give her something to quiet her. The mastoid wound healed promptly, being entirely healed at the end of six weeks. During this entire time the patient complained of very severe headache, particularly on the right side, but sometimes on the other side. The temperature was taken regularly, the highest being 99.4°. The girl was unable, on account of the headaches, to go to the office for dressings during the six weeks. The family physician gave all sorts of medicine for these headaches, sometimes giving as much as six grains of codein in one day. A series of blood examinations revealed no excessive leucocytes. The polymorphonuclear count was normal. Ocular tests were made at intervals, all of which proved negative. Three neurologists saw the patient, and the opinion expressed by them was that the girl was suffering from inflammation of the geniculate ganglion. She was also said to be suffering from hysteria. The mastoid wound having healed, it was the opinion of all that there was no intracranial involvement. Negative examinations of the fundus of the eye, normal blood counts, etc., led to the belief that the neurologists were correct in their diagnosis. Two neurologists decided that she must be removed from her home surroundings and away from her family, and arrangements were accordingly made to send her to the country. The day before she was to leave she showed the first evidence of slight facial paralysis on the opposite, left, side of the face. There was also distinct weakness of the extremities on the right side. Ocular examination revealed double

choked disk. Four days before this report was received another ocular examination was reported negative. It was inferred from the finding of the choked disk that we were dealing with brain abscess. The patient was taken to the hospital and an operation performed. In going through the old wound and uncovering the tympanum it was found that the small area of dura exposed at the previous operation was now about three times as large as at the time of the first operation. A bony absorption had taken place about the dural exposure. An incision was made in the dura, and more than an ounce of pus evacuated from the temporosphenoidal lobe at a depth of about an inch and a quarter. At the time of the operation the girl was in a state of coma, with a pulse rate of not over forty. No anesthetic was given. Two hours after the operation the sensorium was perfectly clear, and the pulse rate increased to eighty or ninety. Following the operation the highest temperature recorded was 100°. On the eighth day the girl became drowsy, the temperature rose to 100½°, and the headache, which had disappeared, returned. The wound was promptly dressed, and in withdrawing the gauze drain a small quantity of pus was removed. An encephaloscope was introduced, thinking there was another abscess cavity, but none was found. The patient became more comatose. Lumbar puncture was made and cerebrospinal fluid withdrawn. Bacterial examination of this fluid was negative. The girl died the following day.

The speaker cited another case, which was operated upon sixteen years ago by Schwartze, and which had been under his own observation for four or five years. The exposed sinus in this case is more and more visible, the surrounding bone seeming to undergo absorption all the time. When he first saw the patient the area of exposure was about one-half inch square; it is now twice as long and twice as broad. He had seen a number of cases in which there was absorption of bone around the exposed dura. The first case mentioned was particularly unfortunate, for the only symptom present was that of persistent headache with nothing else to guide in the diagnosis of brain abscess. The direct cause of death is very uncertain, there being no evidence of an ependymitis or ensuing leptomeningitis.

DISCUSSION.

DR. DENCH asked if he had understood correctly that the facial paralysis was on the opposite side and the paresis of the extremities on the same side as the mastoiditis. The question was answered in the affirmative. The speaker then said that when the abscess is below the tentorium one generally finds weakness on the same side. He was inclined to believe the disease a double one. He had analyzed over a hundred cases of cerebral and cerebellar abscess, and in only one case was a cerebral abscess on the same side with paresis of the extremities. This condition is looked for when the abscess is below the tentorium. He advocated making a large exposure if any area of dura is exposed. No matter how carefully one may chisel, the dura may be nicked, or a small spicule of bone may split it, and in such event there is much more apt to be trouble than when a good, free opening is made. He invariably enlarges an accidental exposure in the middle cranial fossa.

DR. GRUENING called attention to the probability of intracranial pressure where the opening became larger in so short a time. It is not at all likely that only the small area of dura exposed is diseased, but that a larger area is affected. For this reason it is better to have a free exposure. It is probable that there were multiple abscesses in the case reported. That would explain the condition of paralysis of the extremities on the same side.

DR. DENCH expressed the opinion that the careful operator does not expose the dura accidentally. Seemingly accidental exposure is always an indication of diseased bone, which is taken away by the instrument. For this reason he advocated a good, wide opening if there is any exposure at all.

DR. ALDERTON agreed with Dr. Dench. One should be very careful, however, in doing the operation in cases of the exanthemata, especially scarlet fever, to guard against exposure of the dura, particularly in the middle cerebral fossa. He always endeavors not to expose the dura if it can be avoided.

Dr. Alderton spoke of a procedure, undertaken recently, for

The Retroauricular Opening Sometimes Left After the Mastoid Operation.

Very ingenious operations have been devised for closing these openings, but it is sometimes difficult to accomplish these because of the delicacy of the layer of tissue from which the flap is made. In the particular case in question the mastoid cells had been thoroughly destroyed and finally covered with epidermis, but a large retroauricular opening persisted. The method employed consisted in making two incisions, one each side of the opening. These incisions met above and below the opening. The anterior incision was then deepened and the skin undermined forward toward the auricle, so as to form a flap. A third incision was made about one-half inch posterior to the incision back of the opening and parallel to it. The skin and tissues down to the periosteum between these two incisions was now undermined and lifted away from the periosteum. Then this sliding flap was stitched by its anterior border to the flap formed by the elevation of the tissues in front of the most anterior incision; first having freshened the angles formed by two anterior incisions and the margins of the retroauricular opening.

Opening Sinus and Removing Inner Table.

Dr. Gruening reported the case of a child who had recovered from measles, and who, two weeks later, complained of pain in the ear. The family physician made a very large myringotomy, and the child seemed to improve. A few days later, however, the temperature rose to 104°, falling again to normal. This condition lasted four or five days, the family physician finding no symptoms of mastoiditis. Dr. Whiting was called in and pronounced it mastoiditis and probably sinus thrombosis. He advised immediate operation. Dr. Whiting was unable to attend to the case, and the speaker was called in. He found the condition as described. The mastoid was tender at the apex, the chart showed an elevation of temperature, the drum membrane had almost healed, and there was very little swelling of the membrane. When the mastoid was opened a very extensive destructive process was found, ex-

tending back into the occipital bone. The mastoid was pneumatic, and the cells were all filled. The sinus, however, was covered with healthy bone. In this connection he recalled a conversation with Neumann, who said that whenever the cells are exposed it is better to remove the inner table, because it is badly nourished. In accordance with this view the thin bone which covered the sinus was removed and the sinus exposed for about an inch and a half. It looked healthy, so that the jugular was not tied. The child made an uneventful recovery. Granulations sprang up over the sinus wall, much more rapidly than would have been the case had the thin bone been left.

DISCUSSION.

DR. DENCH, referring to the remarks of Neumann, quoted by Dr. Gruening, cited a similar case operated upon by himself. When the operation was finished he asked Neumann if he would have performed it in the same way. The reply was that he would, with the exception that he would have removed the thin plate covering the sinus. The child made a good recovery. It is impossible to lay down an invariable rule about removing the inner table.

DR. ALDERTON had seen about two hundred cases in the Kingston Avenue Hospital within the last two years, some of which were very extensively involved, but in all these cases he had seen only two instances of sinus thrombosis. In one case the sinus was perforated accidentally, and it looked as if the sinus thrombosis was the result of the operative procedure.

NEW YORK OTOLOGICAL SOCIETY.

Stated Meeting, May 24, 1910.

DR. ROBERT LEWIS, JR., IN THE CHAIR.

Gradenigo's Syndrome.

DR. KENEFICK spoke briefly of a case which came into his clinic in November of last year, with otitis media following influenza and developing into acute mastoiditis. There was a large pneumatic mastoid, and the zygomatic cells were involved. Immediately following the operation there occurred paralysis of the internal rectus of the same side. When the patient returned to be dressed it was noticed that an undue amount of pus was escaping from the wound. The entire picture presented was unusual, and it was insisted upon that the patient return to the hospital for observation and operation if necessary. No other symptoms were present. He felt so much better that he insisted upon going home, and disappeared entirely. The man was about forty years of age, his occupation was that of a maker of neckwear. After a number of weeks an investigator was sent from the hospital to see what had become of him. He was found lying in a stupor. He had refused to have anything more to do with surgeons, and his mastoid wound was being dressed by his sister. After ten weeks he returned, with the wound apparently healed, but with pain on pressure posterior to the tip of the mastoid. There was also some pitting on pressure. He submitted to a second operation, when it was found that the tip had not been thoroughly removed at the first, because of the peculiar pneumatic structure of the mastoid, some cells being left very deep beneath the edge of the occipital bone. Otherwise nothing wrong was found. The conditions which followed were none other than could be expected. The patient now comes to the clinic to be dressed, and is apparently all right.

At the time of this last operation a retropharyngeal abscess was discovered and incised. It presented a sinus which admitted a probe upward as far as the base of the skull, its course lying somewhat to the left of the median line.

He is indebted to Dr. Charles E. Perkins of Dr. Dench's clinic for ready access to the literature of the subject, as he recognized the external rectus paralysis as belonging to a class of cases upon which he was at the moment preparing a paper. Without the pharyngeal complication the case falls under a rare class presenting the so-called "Syndrome of Gradenigo," viz., acute mastoiditis, extraordinary parietal and frontal headache, and paralysis of the external rectus. In an experience of nearly fifteen years in the New York Eye and Ear Infirmary, this was the first case of its kind Dr. Kenefick had encountered.

In looking up the subject he found that in all probability the lesion of the sixth nerve could readily occur at a point corresponding with the junction of the petrous tip of the pyramid with the body of the sphenoid bone. How the pus reaches this point is a question which has puzzled the reporters of similar cases, but it would seem most probable, in this case at least, through the petrous portion of the pyramid, which, by the way, is not always petrous, but sometimes cancellous. The postpharyngeal abscess could readily occur by the burrowing of pus through the foramen lacerum medium, and thus come out at once along the pharyngeal surface of the sphenoid body and gravitate behind the pharyngeal muscles of the left side. This will make only the seventh case of its kind on record in the literature, i. e., of cases presenting "Gradenigo's Syndrome" together with retropharyngeal abscess.

Dr. Gruening had seen such cases unattended by pharyngeal abscess. He recalled two cases, one of which died and the other recovered, with paralysis of the abducens. These abscesses may be regarded as safety valves.

Mumps Followed by Deafness.

Dr. E. Gruening reported a case of mumps with certain interesting complications. The patient, a young lady sixteen years of age, had had mumps four weeks before consulting him. During the course of this affection she became dizzy, had inclination to vomit, and became absolutely deaf in the left ear. The physician whom she consulted at that time said she might take pilocarpin internally, but that she would not be better, and that in his experience these cases never improve. Very thorough examination of the patient revealed the fact

that she was absolutely deaf when tested with the buzzer, but heard the Galton whistle at two millimeters. There was no conduction through the bone. No doubt the condition was due to labyrinthine infection. The patient had all the symptoms of Meniere's disease. She had no symptoms of neuritis.

DR. J. B. RAE asked the speaker if the patient had been rotated. The question was answered in the negative.

DR. EDWARD B. DENCH had seen several cases of labyrinthine disease coming on after mumps, and in such cases had found pilocarpin beneficial. After six months the prognosis is bad, but up to that time the condition should improve under pilocarpin. He thought the buzzer overrated. It is impossible to put the instrument into the ear without getting a certain amount of vibration through the bone. In his opinion, the ear which does not hear with the buzzer on the opposite ear is not necessarily absolutely deaf. It demonstrates a remnant of hearing; it does more than shut out the hearing on the well side. If there is a small residual hearing the buzzer will cut it out absolutely.

DR. HARRIS asked if the caloric test was made. Dr. Gruening replied that it was not.

DR. A. B. DUEL had seen a case in which there was a history of mumps a year previously, followed by symptoms similar to those described by Dr. Gruening, with resultant deafness on the affected side. There was complete loss of hearing and of vestibular reaction to the caloric test, and complete loss of bone conduction. The patient had taken pilocarpin without any effect, but it had not been administered until several months after the onset.

DR. RAE asked Dr. Gruening if this could be a septic neuritis. If so, it must involve both branches of the nerve. There might be hemorrhage in the labyrinth. In neuritis one might expect to find deafness without destruction of the vestibular branch, but the nausea and vomiting point to trouble in the labyrinth, not behind it.

DR. DENCH asked if these cases of mumps are not all retrolabyrinthine and not intralabyrinthine.

DR. GRUENING, in closing the discussion, said the symptoms did not point to involvement of the nerve behind the labyrinth, but to involvement of the labyrinth. He considered such cases hopeless as to restoration of hearing. He thought Dr. Dench too optimistic with reference to pilocarpin.

DR. LUTZ presented a temperature chart in connection with the history of a case of

Scarlet Fever Otitis

of seven years' standing. The patient had undergone the mastoid operation at the time, but the ear had continued to discharge. Last January she complained of headache and stiffness of the neck, and there was a rise in temperature. He operated upon her, finding a very necrotic mastoid, but nothing unusual. There was a large pit which had filled in with cicatrix, but the walls of this pit were still suppurating. The patient did very well for a week following this operation; then she had a sudden rise of temperature. The next day one of her knees became involved, apparently with rheumatism, and the salicylates were administered. The ankle and then the hip of the same side became involved, and after several days the shoulder of the other side. He thought he had to deal with a septic case. Upon questioning her he found that she had had frequent attacks of tonsillitis and joint symptoms the year before, and so the conditions were recorded as rheumatism. The temperature continued high, and after using the salicylates and various other remedies, the polyvalent serum was employed. After the second injection the temperature dropped to 97°, running a fairly normal course after that. The patient had had no chills. He wondered if the case was not one of mixed infection, of septic infection in addition to the rheumatism. At any rate, the polyvalent serum, which is a mixture of streptococci, staphylococci and colon bacilli, seemed to be effective in this case, as it is in others of a puzzling nature.

DR. DUEL said all these cases of inflammatory rheumatism, particularly endocarditis, are supposedly of infectious origin. The infection may come from a purulent condition in any part of the body. In a case where there is decided infection in the mastoid or around a large portal of entrance, like a vein, he would certainly think it a case of infection. It is in such cases that one finds bacteremia.

DR. LUTZ added that the temperature would remain at 103 or 104 degrees for a week at a time, not presenting the drops which are to be expected in septic cases. When the patient had severe endocarditis and was absolutely prostrated by it, Dr. Van Cott considered it a straight case of rheumatism.

The polymorphonuclears were 78 per cent, the leucocytosis 18,000 the first time and 12,000 the second.

DR. RAE called attention to the fact that at the meeting of the American Otological Society last year Dr. Halstead, of Buffalo, and the speaker reported cases of so-called rheumatism, both of septic origin. In his own case the doctor who called him in consultation pronounced it rheumatism, while the case proved to be a thrombosis of the sinus. A positive blood culture was obtained. Dr. Halstead's case was very similar.

DR. KENEFICK said that in acute rheumatism following tonsillitis there may be little or no disturbance in the neighboring glands. Acute inflammatory rheumatism involving the joints and later the heart might occur without local manifestation in the throat.

DR. HARRIS said a case was suggested which he had just seen in consultation, where the mischief was done without operation. The patient, a child twelve years old, had the worst endocarditis he had ever seen. He was asked as to the wisdom of removing the tonsils, which were undoubtedly the cause of the trouble. There was no glandular enlargement. Dr. Kerley had seen the case some time previously and thought removal of the tonsils would cause remarkable improvement. The case had been under the care of another physician, who had evidently not watched it very carefully. The patient was up and going to school, and he had not observed the heart condition. This had suggested to the speaker that a similar state of affairs might have existed in Dr. Quinlan's case.

DR. HASKIN called attention to a thesis by Dr. Rosenheim, of Baltimore, published in the *Transactions of the American Laryngological, Rhinological and Otological Society*, in which the ground of rheumatism in connection with the tonsillar ring is very thoroughly covered. The observations were based upon a large number of cases studied in the Johns Hopkins Hospital.

DR. LUTZ called attention to a recent abstract in the *Journal of the American Medical Association*, taken from one of the German journals, in which 87 tonsillectomies in rheumatic patients were reported. In 70 cases there had been no return of the rheumatism.

DR. DENCH, referring to these irregular temperatures, re-

called a case operated upon several years ago for tonsillectomy and adenectomy. The temperature ran from 99 to 101 degrees for about five months. As there was a history of tuberculosis in one branch of the family, naturally the parents were rather alarmed. There was no explanation for the temperature. There had been some enlarged glands, but these disappeared immediately after the operation. The child was seen by a celebrated pediatrist in Munich, whose only advice was to throw away the thermometer, saying children sometimes run a temperature without any cause.

Suspected Brain Abscess.

DR. ALDERTON detailed the history of a boy, eight years of age, seen by him March 11, 1910. The patient had had an abscess in the left ear, earache, but no discharge. The right ear was normal except that the drum was slightly retracted. In the left ear the posterosuperior wall was sagging. There was tenderness over the mastoid antrum, tip and posterior border. The temperature was 99.1°, the pulse normal. The drum was incised and the appropriate treatment ordered. The patient was instructed to report two days later. He did so, and the temperature not having subsided, he was sent to a private room in the hospital. The mastoid was opened and found to be pretty badly involved, particularly along the vertical row of cells from the antrum down to the tip, which was also involved. This was thoroughly cleared out, and the patient seemed to do very well. The temperature did not fall completely, but staid around 99 to 102 and 103 degrees by mouth. The pulse followed the temperature; the respirations were normal. During this time the patient complained of a little fugitive headache, which seemed to be located over the eyebrow of the operated side. It was thought to be due to the tightness of the bandage. This continued from the 14th to the 30th, when the temperature was 100.2°, pulse 100, and respiration 24. At 12:45 that day the speaker called and found the child in convulsions. The convulsive seizures were on the same side, while the opposite side was paralyzed, spasms of the muscles of the jaw necessitated the use of the mouth gag, and horizontal nystagmus toward the affected side was present. At 2:45 the wound was explored. It looked perfectly healthy, and the ear had ceased to discharge. He thought he had to

deal with meningitis brought on by an extradural collection of pus, which had gone beyond the protective boundaries. He uncovered the temporosphenoidal lobe. The inner table seemed to be softer than it should be, but the dura looked normal, except for a little cloudiness. There were no signs of discoloration. The tegmen was removed pretty thoroughly over the antrum and the tympanum. He uncovered the dura of the cerebellum, also the sigmoid sinus. The dura there seemed normal. After the patient came out of the anesthetic there were no more convulsions for some time. The temperature after the operation ran to 101 4/5°, the pulse to 108, and the respirations 24. The next day a blood count was made and showed leucocytosis of 18,382, polynuclears 81 per cent. The boy still continued to run a temperature which varied between 99° and 101°+. The wound was dressed with a moist bichlorid dressing. The temperature fell a little under this treatment. On the fifteenth day after the operation the temperature and pulse went to subnormal, the respirations 26. There was nausea and vomiting, and some headache. A neurologist was called in consultation, and was sure that the original attack previous to the second operation was beginning meningitis and that now a brain abscess had to be dealt with. He recommended an exploratory operation. This was refused by the child's parents, who preferred waiting a while before having so serious an operation performed. The child continued to have headache, and once or twice convulsive seizures, some nausea and vomiting, and he looked badly for a while. Because of the objections of the parents no operative treatment was instituted. Gradually all the symptoms disappeared. On April 30 there was a temperature of 98 3/5°, pulse around 100, respirations 22, the headache, nausea, vomiting, and all other symptoms of cerebral involvement had disappeared. Another blood count showed leucocytosis of 28,000, polynuclears 65%. The pupils responded normally to light. There was a suggestion of beginning optic neuritis. The wound healed, and so far as physical signs are concerned the child's condition returned to normal. No lumbar puncture was made and there was no specific history.

Dr. Haskin cited a case at the Manhattan Eye, Ear and Throat Hospital. The patient entered the hospital complaining of an intense pain in the cerebellar region. Careful exam-

ination was made and all the tests applied with reference to hearing, nystagmus, blood counts, etc. From the negative findings everything was excluded but cerebellar abscess. There was dizziness, explosive vomiting, and choked disk on the right side. The patient denied any specific history. It was finally decided to operate and the field was uncovered. In the mastoid there was found a little softening of the bone but no pus. The posterior and middle fossæ were uncovered, but no evidence whatever was found of meningeal trouble. The wound was closed and the patient did very well. Several days after operation a rash was discovered—a typical secondary rash. A positive Noguchi reaction was obtained. The patient finally was made to acknowledge that he had had a primary lesion and mercurial treatment ordered.

DR. DENCH related an interesting experience with an Arctic explorer who had a profuse external otitis. The otitis cleared up, and the patient was practically all right for a year. He had had a chronic nonsuppurative inflammation in both ears, which caused deafness. After a year he returned, complaining of headache, nausea and projectile vomiting. He denied syphilis. Brain abscess was suggested by a number of the staff. A positive Noguchi was obtained, and the patient was put upon the iodides, 360 grains in 24 hours being given. He was given mercury hypodermatically, and the condition cleared up absolutely. He had beginning neuroretinitis.

DR. GRUENING said when the mastoid operation had been performed and later brain symptoms showed themselves there was too apt to be a tendency to connect the two. He had had such a case two years ago. A woman had been operated upon for mastoiditis and had recovered. She subsequently came to the hospital with high temperature, great dizziness and vomiting. She was referred to the ear department. The probability of meningitis and of brain abscess was thought of, then various tests were made, among them the Widal, and it was found that she had typhoid fever. She was admitted to the medical ward, where she was treated for typhoid fever, from which she recovered.

DR. DENCH asked how long the paralysis of the right side lasted. This case suggested one upon which he operated at St. Luke's Hospital last year. The Kernig and Babinski signs were well marked in the instance cited. Double mastoidec-

tomy was performed, exposing a large area over the cerebellum. The cerebellar symptoms disappeared after simple exposure. Not infrequently simple exposure causes sufficient decompression to induce recession of the inflammatory process.

DR. HASKIN said undoubtedly many cases of meningitis do recover. He cited a case under the care of Dr. Dwyer, in which there was pansinusitis, in which the jugular was tied, and the child reported to be in a dying condition. Dr. Collins and Dr. Zabrisky both diagnosed the case as meningitis and in a dying condition. The child recovered completely. The Hiss serum was given in this case, and, despite the child's serious condition, it reacted and recovered.

DR. ALDERTON, in closing the discussion, said the paralysis of the right side, of which Dr. Dench asked, cleared up entirely after the anesthesia for the second operation. The case was investigated very thoroughly by the neurologist at the Brooklyn Eye and Ear Hospital, all the various tests being made. The patient was only eight years old, and, naturally enough, any specific trouble would have been hereditary. The cases reported by the other speakers were hardly parallel. He had had a similar case several years ago, in which the patient was paralyzed on one side after a double mastoidectomy. He explored the brain, but found nothing. The patient recovered. It reminded him of the cases of encephalitis reported by Abbe. The labyrinth was not explored. The nystagmus cleared up immediately after the anesthetic.

Mastoiditis Resembling Otitis Externa.

DR. DUEL reported a case which was admitted to his service at the Manhattan Eye, Ear and Throat Hospital, in which it was difficult to determine whether there was mastoiditis in addition to a diffuse external otitis. The patient was a man in the early twenties, with a history of earache and swelling of the external canal and surrounding tissues of the ear for ten days. On inspection the usual symptoms of diffuse external otitis were found. There was marked tenderness in front of the tragus, posterior swelling, and some swelling between the mastoid tip and the angle of the jaw. It was impossible to determine whether there was any deep tenderness over any part of the mastoid in which this edema existed, owing to the

fact that the superficial tenderness was so prominent. The canal was much swollen, but not to such an extent as to prevent the introduction of a small speculum. There had been a slight discharge, but it was impossible to tell whether the secretion came from behind the drum or not. It was also impossible to determine the presence or absence of a perforation of the drum membrane. The temperature was 101.6°. The house surgeon operated under the speaker's direction, the patient being prepared for the mastoid operation, should this be found necessary. The fact that there was tenderness far back over the mastoid emissary vein, away from the region of the edema, caused him to decide upon the mastoid operation. He advised a short posterior incision in the line in which it would be made for an acute mastoid operation, and the pushing forward of the periosteum. This was done, and the swelling behind the ear was found to be simply edema. There was no subperiosteal pus. Deep pressure between the mastoid tip and the angle of the jaw caused a pouring out of about two drams of thick, creamy pus from the external meatus. The periosteum was then pushed forward and, without stripping it posteriorly, the operator penetrated the cortex directly over the mastoid antrum. After removing the cortex the superficial cells looked healthy. Owing to the fact that there were no external evidences of pus, he advised going on into the antrum, and, as soon as the curette entered the small opening into the antrum, about an ounce of thick pus welled up from the mastoid. The incision was then enlarged and prepared as far an acute mastoid operation. The periosteum was stripped upward. On removal of the tip and mastoid cortex a large perisinus abscess was found. The granulations extended from about one-half inch above the knee down to the bulb region. There was also a Bezold perforation of the tip. This was washed out. The temperature dropped to normal, and the patient is apparently going on to recovery. He had seen cases with just as much swelling of the soft tissues in which there was nothing but a diffuse external otitis with broken down glands in this region.

DR. HARRIS said there have been reported from time to time cases of

Transient Middle Ear Infection With More or Less Destruction of the Mastoid

found upon operation. In line with these cases he wished to make a preliminary report of a case under his care at the present time.

Four weeks ago a young woman, about thirty years of age, was sent to him for examination. She looked very well and was rosy-cheeked, but complained of a great deal of pain in the head, referred to the back of the head in the occipital region and extending over the parietal region of either side. There was pain in the ears and pain over the mastoid. Pressure over the back of the head elicited pain; pressure over the mastoid and beneath the mastoid of either side also elicited pain. There was also pain in front of the ear. Examination of the ear drums was entirely negative, both being perfectly normal. There was no swelling over or below the mastoids. The temperature was normal; the nose and throat were normal. He felt quite positive that there was no mastoid involvement, and considered the condition either neurotic or rheumatic. Large doses of aspirin were given, with some benefit. The patient went on with her work. In connection with the aspirin he gave large doses of iodid of potash. Every time she took it she had pain in both ears. Still feeling that he had to deal with a noninflammatory condition of the mastoid, he put a fly blister over it. All the pain disappeared. On account of the complaint of pressure he inflated the ears, with no benefit. There was a little catarrhal swelling of the tubes. He dismissed the case, as there seemed to be nothing but a neurosis. A week ago she returned, saying all the pain had recurred. There was more extensive tenderness over the mastoid tip on the left side. There was still absolutely nothing in the fundus of the drum or in the canal. The patient entered the hospital on Saturday, and in a more or less empirical way he put on an ice coil, and ordered sol. Magendie, if there was much pain at night. She still complained of pain, so much so, in fact, that she could not swallow solid food, nor could she masticate food. The temperature was virtually normal, pulse and respiration normal. The blood examination

was not satisfactory. The report said there was a leucocytosis of 9,000 and a polynucleosis of 46 per cent, which the pathologist insisted was right. There was no history of discharge from the ear, no peculiar onset of the pain, so that she could point to a certain day on which she had earache. The hearing is normal. She had had no vertigo except since she entered the hospital and had been taking large doses of quinin. She had had some fugitive chills, and the thought of malaria presented itself. The plasmodium was not looked for. There was no history of rheumatism. The pain over the mastoids was intense, especially over the left, and was not in one spot, but over the whole cortex. The pain had continued for four weeks, and he proposed to explore the mastoid and see if the explanation for it could be found there.

Dr. Berens had had a case with a very similar history. Dr. Gruening and the late Dr. Bull both saw the case. The pain finally became so severe that the mastoid on one side was opened. There had been no history of ear trouble other than this pain, nor had there been any elevation of temperature. The mastoid was found to be full of very large air spaces, and in these spaces were evidences of osteophytic deposits in the form of stalagmites and stalactites. The patient made an uninterrupted recovery on that side, and the pain grew so intense on the other side that that was finally operated upon. This was also found to be full of large air spaces and typical osteophytic deposits. There was no history of an ear discharge at any time in the girl's life. She died suddenly two or three years later, and some cerebral lesion was suspected. The brain was thoroughly examinel and nothing found. The mastoids were examined, and the wounds found to be filled with normal cicatricial tissue. There was no recurrence of the pain following the operation.

Dr. Haskin had operated upon a similar case and had found similar conditions to those described by Dr. Berens. The mastoid was absolutely dry and sclerotic, with no inflammatory condition and no pus. The mastoid bone cavity was filled with paraffin and sewed over. The patient made a rapid recovery, left the hospital in four or five days, and never had a return of the pain.

Dr. Duel reported a case in which there was continuous pain and tenderness over the mastoid with an apparently nor-

mal drum. There was no history of a discharge from the ear. The hearing was good. The mastoid was opened and found to be filled with greenish-yellow pus.

Dr. Dench said pain such as that described by Dr. Harris had been explained as due to inflammation of the geniculate ganglion. This was Hunt's explanation. Dr. Taylor had operated upon one or two cases for resection of the nerve of Wrisberg, with complete relief of the pain. He has seen more than one case of this kind in neurotic women, and had always considered them as some form of neuritis.

Dr. Berens thought the case to which he had referred would have been cured by Hunt's operation. He called attention to the fact that there may be mastoiditis without involvement of the middle ear.

Dr. Gruening said Dr. Knapp had reported a number of cases of the kind under discussion in which, upon operation, he found nothing but a sclerotic mastoid, and in which the pain stopped after operation. Many years ago the speaker had had a case exactly like that described by Dr. Harris. The patient was a neurotic individual in the German Hospital, who had occupied a bed near a patient who had been operated upon for mastoiditis. After his neighbor's operation the patient complained of pain in the mastoid. So persistently did he complain that finally the mastoid was opened, and for the first time the speaker had the privilege of seeing a perfectly normal mastoid in the living subject.

Dr. Kenefick called attention to the fact that pain such as that described by Dr. Harris may have its origin in the mouth. He cited a case in which a capped tooth was the source of the trouble, and emphasized the importance of a careful examination of the teeth in such cases.

ABSTRACTS FROM CURRENT OTOLOGIC, RHINOLOGIC AND LARYNGOLOGIC LITERATURE.

I.—EAR.

The Treatment of Acute Purulent Middle Ear Inflammation With Bier's Hyperemia Method.

SPIRA (*Monat. für Ohrenheilkunde,* Vol. 44, pp. 289, 1910). This method of treatment, which the reviewer had formerly compared in safety to a dynamite cartridge in the hands of the small boy, is again revived, this time from Russia. As usual, one or two cases are instanced, and the careful investigations of the unbiased German school are not considered. As usual, also, the brilliant remark is made that it should not be used in the presence of intracranial complications.

Horn.

Postoperative Labyrinthitis.

BONDY (*Monat. für Ohrenheilkunde,* Vol. 44). Detailed report of a case in which, following an ordinary radical operation, with an absolutely intact labyrinth, the patient two days after the operation showed symptoms of a purulent labyrinthitis without fever. The patient refused operation, and the symptoms rapidly cleared up for two days, when meningeal irritation manifested itself. The Neumann radical labyrinth operation was done, but the patient died of a purulent labyrinthitis. The discussion brings out the necessity of a careful distinction between serous labyrinthitis, where we need not operate, and purulent labyrinthitis, where the Neumann operation must be carried out without a moment's delay.

Horn.

The Treatment of Tinnitus Aurium.

BARR (*British Med. Jour.,* October 16, 1909), in his paper, at the recent meeting of the British Medical Association, reviewing the subject, was exceedingly discouraging, and added nothing new to our knowledge of the subject. He condemns Siebenmann's treatment with phosphorus, for the alleviation of otosclerosis, although he has never had any personal experience with it. A general hygienic treatment, with removal to

a more favorable climate, is all that he suggests. The surgical treatment of this trouble was handled by Lake, in the same journal, who seems to consider Babinski's results as not warranted and warns against the use of lumbar puncture.

His results in ossiculectomy have been unfavorable, and he considers the procedure of little use. His operations for the destruction of the entire labyrinth have also been unsuccessful, but he thinks the matter will bear further investigation. The ligation of the carotid he considers quite indefensible. The statistics on the division of the auditory nerve within the skull have resulted in 8 cases in 3 deaths, 2 failures and 3 successes. He considers the operation entirely unjustifiable. *Horn.*

Inflammation of the Labyrinth and the Labyrinth Operation.

RUTTIN (*Monat. für Ohrenheilkunde,* Vol. 44, p. 459, 1910) reports 100 cases of labyrinthitis which he had the opportunity of observing at the Vienna Clinic in the last two and one-half years. Briefly the indications for operation are as follows: In the presence of one or more signs of physiologic activity of the labyrinth (hearing, reaction to heat and cold, reaction on turning, absence of fistula symptom) the radical operation alone is carried out. If after the radical operation the clinical tests show that these labyrinthine functions have ceased the radical labyrinth operation is carried out in a second sitting. If there is a total absence of the labyrinth function at the first examination, then the radical mastoid and the labyrinth operation are done at the same time. Of the 100 cases, 53 were classified as circumscribed purulent labyrinthitis, and 47 as diffuse purulent labyrinthitis.

Of the 53 circumscribed cases, the radical mastoid alone was done 35 times. The labyrinth operation was done at the first sitting in 13 cases and at a second sitting in 5 cases. In the group of 35, 34 recovered and one died of tubercular meningitis. In the group of 5 cases where the labyrinth operation was carried out at a second sitting, three recovered and two died from brain abscess. Of the 13 cases of primary labyrinth operation, 9 recovered and 4 died. (Meningitis before the operation, 1 case; meningitis after the operation, 1 case; brain abscess, 2 cases.)

Of the 47 diffuse cases, 13 are classified as manifest, 34 are

classified as latent. All had the labyrinth operation performed. Of the manifest cases, 6 recovered, 7 died. (All with meningitis before the operation.) Of the 34 latent cases, 26 recovered, 8 died. (Meningitis before the operation, 4; tubercular meningitis, 1; brain abscess, 3.) In other words, only one death could be charged to the labyrinth operation, an operative mortality of 1%. *Horn.*

Attic Suppuration.

MILTON J. BALLIN (*New York Medical Journal,* November 6, 1909) urges more attention to the intratympanic operative procedure for the treatment of chronic middle ear suppuration. Cases in which the best results have been obtained are those in which the pathologic condition was confined to the attic, without too extensive changes in the osseous walls. He regards suppuration of the attic the causal factor in the great majority of cases in keeping up the purulent discharge from the ear. Attic suppuration may be divided, first, into those associated conjointly with a middle ear affection, and second, those developing independently and at all times localized and associated with a perforation in Schrapnell's membrane. In the treatment of attic suppuration Ballin has had the best results with the use of peroxide of hydrogen instilled into the ear. In certain cases solution of alcohol and boric acid has worked well. Where instillations do not have any effect he uses 2% solution of alcohol and boric acid injected with a Hartmann canula into the attic. In obstinate cases removal of the incus and malleus, together with at times the upper wall of the attic, will be necessary, and in the author's hands is wont to give satisfactory results. He reserves the radical operation on the mastoid for such cases as fail to be cured by this procedure. *Harris.*

After-Treatment of the Radical Operation Without the Use of Tampons.

ISEMER (*Archiv. für Ohrenheilkunde,* Vol. 80, p. 125) in the clinic at Schwartze treated 14 cases of radical operation without introducing any tampons. The method pursued was to remove all the dressing at the end of seven or eight days after the operation and to substitute only a narrow strip of gauze in the external canal and in the posterior auricular

wound for the purpose of taking up the secretions. The report of eleven of these cases is given in full. In only two of the fourteen was there an epidermatization and healing. Usually in three weeks pronounced granulation took place with increased secretion. The contour of the operative field was lost, and it was impossible to get any view into the depths of the wound. At the end of five weeks contractions of these granulations took place, and membranous bands were thrown out. These bands were of two forms, one lying in front of the antrum, shutting off the aditus, leaving in this way a large pocket for holding pus, the other membrane, with a small perforation on its upper portion completely shutting off the middle ear. The author, from his experiences in these cases, regards the procedure as in every way disadvantageous and without merit. He points out that the value of the introduction of tampons lies first in their ability to take up the secretions of the wound, and second, their preservation of the form of the cavity and prevention of adhesion arising from granulations. *Harris.*

Endoscopy of the Pharyngeal Mouth of the Eustachian Tube.

MAYR (*Archiv. für Ohrenheilkunde*, Vol. 80, p. 192) reports two cases illustrating the value of the direct examination of the pharyngeal opening of the eustachian tube. The first was a youth of 17, who complained of nasal obstruction and pressure in both ears. A diagnosis of chronic hypertrophic rhinitis and pharyngitis was made. Both drums were retracted and thickened. Catheterization of the left tube was easy, but the smallest instrument could not be passed on the right side. Posterior rhinoscopy did not explain the difficulty. The employment of the endoscope, however, revealed a half moon, grayish membrane stretching between the anterior and posterior tubal prominences and tightened by the act of swallowing. A strong, curved sound was employed to break the membrane after preliminary cocainization. There was no return of the membrane after six months.

The second case was a man of 28, who complained of difficulty of hearing with tinnitus in both ears and irritation in the throat. Both drum membranes were thickened and retracted. Posterior endoscopy showed the remains of adenoid tissue. Catheterization of both ears was easy, but was immediately fol-

lowed by brisk bleeding from the nasopharynx, which was easily controlled. The source was not discernible, although the rhinoscopic mirror suggested that it was proceeding from the right choana. Two days afterward Mayr made a direct examination and discovered on the floor of the mouth of the right tube a swelling 3 to 4 mm. high resembling a papilloma, touching of which caused bleeding. Under endoscopic control this was touched with the galvanic cautery without any reaction. Six months later the mouth of the tube was found normal.

The author argues that these two cases demonstrate that the endoscope is not a toy, but is an instrument of actual diagnostic and therapeutic value. He employed an endoscope made by Reiniger. [The abstractor is not acquainted with this particular instrument, but should expect that the pharyngoscope recently invented by Hays would prove satisfactory in every way.] *Harris.*

Two Unusual Cases of Otitic Sinus Thrombosis. Operation. Recovery.

HUGH B. BLACKWELL (*New York Medical Journal,* February 5, 1910) reports two cases of sinus thrombosis depending on ear disease, presenting several atypical features. In the first case, a boy of six, there was a history of discharge from the ear for the last five years. Two weeks before admission to the hospital the ear ceased to discharge. This was associated with pain in the head and throat. Later the discharge returned. One week before coming to the hospital the patient had a chill, which was repeated nightly for six nights. The patient at the time of admission appeared decidedly septic. Edema over the mastoid with tenderness was present. The cells were found broken down and filled with pus and granulation tissue. No trace of the structure of the sigmoid sinus was present. The course of the lateral sinus was followed backward one and a half inches to the knee, where the vein appeared normal and was opened. The removal of the clot found here was followed by a gush of blood. No bleeding followed the curetting of the jugular bulb. The vein was then excised in its entire extent. There was prompt and uninterrupted recovery.

Attention is called to the apparent absence of symptoms,

either local or general, pointing to sinus involvement until a cortical perforation of the mastoid process was imminent. Owing to the entire destruction of the sigmoid and portions of the lateral sinus, as revealed at the time of the primary operation, it would appear that there had been a thrombosis for a period of at least several weeks.

The second case, also a boy of six, was operated on 72 hours after the initial earache. There was an extensive clot in the lateral sinus. There being no return of the blood through the jugular bulb, the right jugular vein was excised.

The author calls attention to the unreliability of the symptoms indicating the beginning of a sinus thrombosis and the importance of thoroughly exposing and inspecting the walls of the sinus in all cases of mastoiditis where the operator has the slightest reason for suspecting a sinus involvement. He urges the importance of operative celerity in such cases. In neither of these cases was any attempt made to perform a formal mastoid operation. *Harris.*

The Employment of Hot Air in Otology.

COME FERRAN (*Journal of Laryngology,* August, 1909). In affection of the middle ear catheterization by means of hot air has given such good results in the author's hands that he feels a report is of value, even if he has no new facts to offer. He has, however, modified the apparatus to "a simple Politzer bag prolonged by an aluminum neck containing an electrical resistance." This is easily managed and sufficiently light not to make catheterization painful to the patient.

The unhappily numerous cases of pure otosclerosis have been little influenced by the treatment, but in many other cases, especially those of tubal catarrh, the results obtained have been far better than by any other method. The action of hot air in certain cases was found to be more rapid than ordinary catheterization. Indeed Ferran reports cases where a return to normal hearing resulted after this treatment, whereas only slight improvement had been obtained before.

The author believes that the benefit, aside from the mechanical effect of hot air, lies in the modifying of the condition of the mucous membrane, and speaks of seeing frequently, though not always, when examining rhinoscopically before and

after inflations of hot air, contractions of the mucosa similar to that seen after painting with cocain or adrenalin.

The use of hot air is only contraindicated in cases where labyrinthitis is suspected. Otherwise it is harmless if only moderate heat is used. *Harris.*

Anesthesia of the External Auditory Canal and Drum Membrane by Chlorid of Ethyl with Speculum Permitting of the Instantaneous Evaporation of the Chlorid of Ethyl.

KOENIG, Paris (*Revue Hebdomadaire,* November 6, 1909). This is the application of the method first described by Schild of Baltimore some six years ago. On account of certain unsatisfactory features of Bonain mixture (menthol, carbolic acid and cocain), the author has recently employed, with good results, ethyl-chlorid to anesthetize the drum membrane. He has made use of it in a number of cases and says that its employment is free from any drawbacks. It is particularly indicated for paracentesis. He has modified Schild's apparatus so that instantaneous anesthesia is obtainable. This consists of an aural speculum provided with a narrow canal running its entire length and terminating on the edge by a slight elevation, to which is attached a fine rubber tube 20 cm. long. At the end of this tube is a small glass tube for the mouth of the operator. By means of this the Politzer bag employed by Schild can be dispensed with. One can insufflate with air at the same time that he introduces the jet of chlorid of ethyl. This is instantaneously evaporated, producing immediate anesthesia of the tympanum. No assistant is required, and the entire operation can be completed in ten seconds. *Harris.*

A Study of Galvanic Nystagmus by Means of the Nystagmograph.

BUYS (*Monats. für Ohrenheilkunde und Laryngo-Rhinologie,* 1909, Vol. 43, p. 801) says that galvanic nystagmus is either completely rotatory in type or almost so. Nevertheless, he found it able to record the movements with his nystagmograph. He says that the apparatus is either much more sensitive than the usual methods of observation, or else the movements with the closed eye is greater than with the open eye, because he found that three mil-ampers showed distinct record on the nystagmograph, while it required at least 10 mil-ampers to cause movements sufficient for ocular inspection.

Wood.

Disturbance of Taste in Middle Ear Disease.

SCHULZ (*Arch. f. Ohrenh.*, Bd. 79, 1909, p. 220) made a careful study of 55 patients with different forms of middle ear disease. He found that in 39 cases of chronic suppuration of the middle ear six showed no disturbances of taste, and in no case was the function absolutely abolished. There was some perversion and loss for certain tastes, most frequently for sour, then came bitter and salt, while the perception of sweet was seldom destroyed. When the chorda tympani nerve was destroyed by operation complete ageusia resulted, as in excision of the malleus and incus. If the nerve was severed the loss of taste was permanent. Perversion of taste did not occur in operative cases. In acute suppuration there were no cases of complete ageusia, and in two cases no disturbance of taste could be detected. In only one case of chronic catarrhal otitis media could any disturbance of taste be discovered.

Wood.

Cosmetic Treatment of Paralysis of the Facial Nerve.

BUSCH (*Beiträge zur Anatomie, Physiologie, Pathologie, etc.*, Vol. 3, 1910, p. 380) proposes to overcome the deformity in cases of Bell's palsy of otitic origin by the suspension of the angle of the mouth. His method of operation is as follows:

Under local anesthesia an incision is made about two cm. long, just beneath the lower edge of the zygoma, and it is carried down to and through the periosteum. A second incision about one cm. long is made about a half cm. above and parallel with the angle of the mouth. A suture of aluminum bronze is carried from the upper wound through the periosteum of the zygoma and out the wound above the angle of the mouth, care being taken that the suture does not penetrate through the mucous membrane of the mouth. The suture is passed upward, just posterior to its position when it was brought down, and emerges once more at the upper incision. On tightening this suture the angle of the mouth will be elevated. The deformity should be over corrected. After fastening the suture the two small skin wounds are united and dressed with collodium. Busch claims that the cosmetic result of this operation is very satisfactory and that the wire suture does not give any inconvenience. Of course, the operation does not restore muscular activity.

Wood.

Contribution to the Symptomatology and Pathologic Histology of Fistula of the Labyrinth.

RUTTIN (*Monats. für Ohrenh. und Laryngo-Rhinologie,* XLIII, Jahrg., 2 Heft, 1909, p. 121) reports 16 cases of fistula of the labyrinth, one of which was carefully examined histologically. A clinical diagnosis of fistula was made by alternately compressing and aspirating the air in the external auditory canal, and noting the associated movements of the eyes. The patient whose ear was examined histologically was 51 years old and had had otorrhea without pain and without known cause for four to five years. For three years he had had very marked deafness. He had been dizzy for two days, with a tendency to turn towards the left, and for the past year had had slight attacks of dizziness, off and on. There was spontaneous rotary nystagmus, which was greater towards the left than towards the right. The caloric reaction of Barany was typical. A few days before death from tuberculosis there was a complete left-sided facial paralysis. The histologic examination showed that there was a fistula in the neighborhood of the inferior edge of the foot plate of the stapes. *Wood.*

Congenital Syphilitic Disease of the Ear.

FRASER (*Journal of Laryngology,* August, 1909). After reviewing the theories of various authorities as to causative conditions in congenital specific deafness, the author goes on to his report of 33 cases observed during a period of twenty-eight months. The examinations and corroborations were as thorough as possible under the difficulties of such investigation. Aside from a detailed report of each case the whole is carefully tabulated as to results in regard to:

Age—More than half between ages of 6 and 15.

Sex—Generally stated that females are more often affected; no striking preponderance of females here.

Position of Patient in Family—Nearly half were eldest or only child.

Mode of Onset—In some gradual, others sudden. History of tinnitus giddiness varied.

Condition of Teeth and Eyes—Interstitial keratitis was present in all but one.

Condition of Patient at Time of Examination—Nineteen complained of tinnitus, 12 suffered from occasional giddiness. The amount of hearing was remarkable in a large number.

Otoscopic Appearance—Large percentage showed signs of tubotympanic catarrh. Condition resembles eustachian obstruction; mistake in diagnosis easy.

Tuning-fork Tests—Galton whistle was heard up to almost the upper tone-limit in a remarkable number of cases, and the middle and upper tone forks were heard by more than half of those examined.

Vestibular Irritability—The condition of the cochlear and vestibular apparatus was found to correspond.

Facies of Patient: Condition of Nose and Pharynx—Of 15 examined, 8 were regarded as typical.

Treatment.—Prognosis in cases of long standing is hopeless, the only chance lies in the general practitioner making correct diagnosis and commencing treatment at once. *Harris.*

Various Points in the Technic of the Radical Operation on the Middle Ear.

W. LANGE (*Beit. z. Anat. Phys., etc., des Ohres., der Nase und des Halses,* Bd. III, 1909, p. 170-216) in this article goes over the various points in the technic of the radical operation which seem to him important in obtaining rapid and permanent healing. He says that the best guarantee for a permanent cure of a middle ear suppuration is the radical operation, which, when healed, presents an epidermatized cavity approximately the size of the original operation wound, and which can be fully inspected through the external canal. He condemns too large an incision and says that one beginning not higher than the upper edge of the insertion of the pinna and running dow to the point of the mastoid process is sufficiently large to give all the room required for the ordinary radical operation. More room may be obtained when necessary by a horizontal cut running backward from the middle of the original incision. The bone wound must be made sufficiently large so that the antrum and cells are all completely opened up and no overhanging ledges left. If the hypotympanum is not diseased, it has been his custom in recent years to leave it undisturbed. It is important to remove a small portion of bone from around the opening of the eustachian tube, as this is the best method of securing permanent occlusion of its lumen. A patulous tube is very apt to cause reappearance of a mucoid discharge during attacks of coryza or nasopharyngeal congestions. In cases of chronic mastoid suppuration,

where the process in the tympanum is healthy, or has apparently healed, for instance, when the drum membrane is firmly adherent to the internal wall of the cavity, quicker healing will take place if the tympanum itself is left alone. But the malleus and incus, if present, should always be removed. As a rule, during the free removal of bone and the opening of the various pneumatic spaces, the mucous membrane is also taken away. Should small particles be left behind, generally no harm results. Occasionally, however, by rapid growth they cover the surface with mucous membrane, or give rise to retention cysts. When cholesteatoma is present it is best to remove the lining matrix.

Lange is very strong in his belief as to the value of primary closure of the retroauricular wound. It should always be done except when there are actually inflammatory changes in the soft tissues or when labyrinthine or intracranial complications are present or suspected. In children under ten years it may be advisable to keep the external wound open. In cases of tuberculosis, Lange advocates the primary suture. As to the plastic treatment of the external canal, Panse's or Schwartze's methods give very good results, the latter especially when the bone wound has been very extensive. Perhaps a more generally useful method is to make the longitudinal incision of the canal oblique, running from within and below, outward and upward. After cleansing the wound and the removal of loosened particles of bone or free ends of soft tissue, the cavity should be carefully and rather firmly packed, preferably with iodoform gauze. If no untoward symptoms developed the first packing should remain for eight days, though the external dressing must be changed in three or four days. When the granulations are growing rapidly the wound should be lightly but carefully packed with gauze strip preferably impregnated with some antiseptic powder other than iodoform. Excessive granulations should be cauterized or removed. Lange does not approve of the no-packing method of treatment in the radical operation.

The transplantation of epidermis is, as a rule, not necessary, but Thiersch's flaps may sometimes be advantageously applied to carefully prepared granulating surfaces. Although the secretion may have ceased and the complete epidermatization of the cavity have taken place, positive judgment as to the final outcome cannot be made under three months. The cavity

should then show either of the three following conditions: First, a firm, smooth epidermatization of the entire space, including the tympanum and closure of the tube. Second, epidermatization of the cavity, with exception of smaller or greater portions of the tympanum in which the mucous membrane is still present. The tube in these cases may be either open or shut by a thin membrane. Third, spreading of the epithelium of the mucous membrane over larger areas of the wound cavity until maybe the whole cavity is almost completely lined. Good results are obtained, even when a large part of the cavity is covered with mucous membrane, provided that this cavity can be easily inspected. However, occasionally small cysts develop and sometimes rather large retention cysts, which later occasionally resemble blood extravasations or varices of the dura, and if in the right position sometimes suggest the lateral sinus. There are a few cases which require a year or more before complete cessation of the discharge takes place. In those cases in which a complete cure is not accomplished the radical operation is of value, because it makes the ear condition absolutely safe, as far as dangerous or fatal complications are concerned. Although retroauricular openings are not dangerous, and under certain circumstances justifiable, the secondary closure is, however, of distinct advantage, and this can best be done by some form of plastic operation. If the opening behind the ear is closed it is necessary that there should be a good wide opening through the auditory canal, otherwise there will be insufficient drainage of the mastoid cavity. *Wood.*

Rotation Irritations.

W. MULDER. Experiments were made with van Rossem's apparatus. They consisted of periodic stopping of a rotation. (1) If periods of about two seconds are taken one feels rotation and after-sensation alternately, with increase and decrease. (2) Somewhat shorter: motion to and fro. (3) Still shorter, e. g., with rotation velocity 20' per sec., and intermission of 0.4 sec., cessation. A mechanical explanation cannot be accepted. Fatigue plays a small part, as the illusion is better felt after some duration of the experiment. It is analogous to the experiment of Helmholtz, where a gray or glittering sensation is observed when the rotating disk is

divided into white and black sectors. Gray corresponds with the cessation in experiment 3, glittering with the motion to and fro in experiment 2. Stronger illumination needs more interruptions per second of the white, so with greater rotation velocity more stops per second are necessary. Fatigue in both cases favors the fusion. The very slow decrease of the rotation sensation was known; following Fick (with the retinal phenomenon) we must also accept an increase of the excitation condition after the stopping of the irritation. What is mixture in Helmholtz's experiment is here neutralization, as the components are respectively positive and negative.

Struycken asked if the second irritation, which followed the first, proceeds in exactly the same way. The experiment is made with some jerks. The head is held eccentric.

Mulder stated that the second irritation proceeds as the first, anyhow that it lasts as long. The course of both is not exactly known. The jerking and shaking of the static organ is certainly a difficulty which should be remedied as much as possible. The eccentricity seemed to be no hindrance in van Rossem's experiments, from computations. *Blaauw.*

Treatment of Meniere's Disease.

DR. MOLL could not accept the conclusion of Ten Siethoff that his cures showed that no serious affection of the semicircular canals could have been present. Menière's disease without aural symptoms does not exist. Recovery from dizziness due to middle ear affection through nasal treatment is not caused by reflex, but by disappearance of swelling in the eustachian tube. The theory of Mach-Breuer explains the whole picture. He does not deny that reflexes can play some role. He could not admit true sclerosis in the cases related by Ten Siethoff with recovery from or amelioration of deafness, but regards them as cases of middle ear catarrh. Of course in every case the nose should be carefully examined.

Dr. Ten Cate reported three cases where nose treatment influenced strikingly the symptoms of Menière's disease. (1) A man who suffered for years with attacks of dizziness and noises in the ears, often combined with nausea and vomiting. As long as he can remember he has been somewhat hard of hearing. Drums perfectly normal; tuning fork examination pointed to labyrinthine deafness. Postrhinoscopically, very

great swelling of the posterior parts of the lower conchæ, which were removed. Since then no attack (half a year), the noises and deafness not better. (2) A deflection of the septum was present; after removal no more attacks (three months). (3) Policlinic patient for years under treatment for chronic otorrhea of both ears. He was often dizzy. Since two years, attacks of dizziness with loud noises and vomiting. He often falls during an attack, which lasts from a quarter to half an hour, and ends with a profuse perspiration. The tuning fork shows a combination with labyrinthine deafness, namely, marked diminution of the bone conduction. A large spina septi was found, removal of which caused the spells to disappear for half a year.

Dr. van Dusseldorp reported a similar case. In September, 1907, a gentleman presented himself, suffering for three months with dizzy spells, noises and diminished hearing. He had sensation of turning from right to left; nausea ushers in the attack. After the first attack, the noise and loss of hearing set in, which remained the same. He was entirely well up to three months ago. Drums normal; no tubal or middle ear catarrh. Whisper voice right at 3.5 meters; left at 1.5 m. C. (128 v.) is not perceived by bone conduction, either right or left. Air conduction gives for C. right 45 sec.; left, 25; for c^4 right 15 sec., left 20 sec. (for normal C. through air 75 sec., c^4 30 sec.). On both sides, swelling of the tuberculum septi, especially left; very painful on touch. This left side was treated with the galvanocautery. Forty-eight hours later patient was free from his complaints; no more dizziness, no noises, no deafness. Whisper voice: right 4 m., left 6 m. C. at the left mastoid, 16 sec.; not perceived, right. For air: right, 28 sec., left 35 sec.; c^4, right 30, left 28 sec. On November 1 again complains of noises and deafness, since a week; dizziness had not returned. The right nasal side was treated as the left; 24 hours later disappearance of noises and deafness; hearing of both sides 6 m.

Prof. Burger could not accept Ten Siethoff's standpoint in general, but saw cases with the most pronounced symptoms of Menière's disease favorably influenced through nasal treatment. He describes a case (reported separately).

Dr. van Anrooy mentioned a case of dizziness with latent

inflammation of the maxillary sinus, however without aural disturbances.

Prof. Zwaardemaker pointed out that different sorts of dizziness have been reported, some in connection with middle ear affections, and mostly insufficiently explained. The vertigo nasalis does not belong to the picture of Menière's disease. Here the three chief symptoms must predominate. Ten Siethoff's opinion of a reflex, originating from the nose, is untenable. The supposed reflex arc is not known.

Dr. Hartog stated that the cases mentioned by him in the previous meeting had been examined acoustically. He mentioned also a case of serious Menière's disease with suppuration of the sphenoid sinus. The dizziness appeared when the secretions had accumulated high up in the nose. He considered the connection unquestionable.

Dr. Polak thought that in some cases the connection is apparent, and the recovery from the dizziness accidental.

Dr. Boon mentioned a typical case, with two to three attacks daily. Air insufflations and massage after Breitung had little result. The pressure probe of Lucæ helped directly, and three months' treatment with it made the recovery permanent. *Blaauw.*

Aural Pyemia.

H. Burger (*Tydschr. v. Gen.*, February 1, 1908), after describing the general signs of pyemia which accompany sinus thrombosis, gives the details of the first four cases of otogenic inflammation of the transverse sinus, which came under observation during the first year of the University Clinic for Ear, Nose and Throat Diseases in Amsterdam. The clinical picture depends upon the closure of the vessel and the suppuration of the thrombus. Headache, vomiting, changes of the pulse, etc., can be present. Often compression symptoms are absent. Generally the blood infection predominates, rarely under the picture of toxemia with high fever, unconsciousness, paralysis of the heart, etc.; much more frequent is the pyemia with high rises and quick lowering of the temperature, severe chills, swelling of the spleen, metastatic suppurations in the lungs and everywhere in the region of the large circulation. However, thrombosis of the sinus can be present without pyemic fever. Burger operated some years ago on a young man with an acute mastoiditis, with slight elevation of

temperature. He found a perisinus abscess with abundant granulations on the dura mater. At the first dressing of the wound the dura mater looked much clearer, and an opening was found in the wall of the sinus, which had been covered with granulations during the operation. The obstructing thrombus could be seen towards both sides in the open sinus. The case recovered without disturbance. Especially in little children the typical fever type is found absent.

CASE 1.—A seriously sick man, 28 years old, entered the hospital on December 10, 1906. He was apathetic, answered slowly but correctly. The right facialis was paretic in all its branches. He had been sick for two to three weeks; headache, fever, soon confined to his bed. For four days he had had chills, with high temperature. The day before, the temperature in the morning was 39.5°, in the evening 40.3°, yesterday 38.5° and 40°. Since the commencement of the disease the right ear, which had formerly secreted now and then, had begun to run again. No nausea, vomiting or dizziness. The right external ear is filled with fetid pus and granulations, which make the drum invisible. Pressure on the mastoid process is painful. No sign of brain pressure or cerebral inflammation. Diagnosis: Secondary inflammation of the transverse sinus. The same day, operation. The mastoid process consisted of one cavity filled with partly purulent and cheesy, partly cholesteatomatous masses. The posterior wall was sclerotic; towards the front the posterior wall of the external canal had nearly disappeared. The auricular bones were not found. The bony wall of the labyrinth, as far as visible, was smooth and normal. In the point of the processus, a carious fistula, which, after enlargement with the chisel, led into the posterior cranial cavity. Pus and a large quantity of black, reddish, watery, fetid fluid escaped. The fistula led towards a gangrenous spot in the wall of the transverse sinus. This was exposed until its wall looked normal. Patient stood the two hours' operation well. During the night he had two severe chills. The temperature directly before the operation was 38°, went up during the night to 39°, in the morning 40.3°, sank during the day to 37.2°, and rose again during the night to 40°. This led to ligation of the jugularis int., which looked normal, with fluid blood. The bandage of the first wound was soaked with blood, and what

had remained in the surrounding of the sinus had a most disagreeable stench. On the fifth day the disease took an unfavorable turn. The patient vomited in the afternoon, the temperature rose (in the evening, 39.8°); a slight papillitis was found in the right eye, in the left the disk was slightly hazy upward and downward. The condition was also unfavorable on the sixth day; he responded more slowly. Patient dozed usually with the left eye closed. No headache or any sign of meningitis. On dressing, yellow, odorless pus was found, with the exception of the peripheral part of the sinus, which still produced black fetid pus. It contained a black, soft thrombotic mass. A third operation removed the bone over the horizontal part of the sinus in the direction of the confluens sinuum; the sinus was cut open over a length of 5 to 6 cm., the thrombotic clot removed, when bleeding appeared, which needed tamponing. The outer sinus wall looked healthy and pulsated. The operation was well borne. During the day the patient complained of pain low down in the right side, especially with deep respiration. No change on percussion; with auscultation pleuritic fremitus. The skin and scleræ showed a yellowish tinge. During the evening again a chill, with temperature 39.4°, frequent (132), small, hardly palpable pulse and disturbance of consciousness. Injection of camphor oil. From now on the pyemic fever was most pronounced. During the 13th and 18th day the daily differences were of 3 and 4 degrees, now and then chills, sometimes vomiting, but no headache or any sign of meningitis. His subjective feeling remained good until the end. The icterus increased without enlargement of the liver. On the 17th day pleuritic fluid was aspirated and resection of a rib performed. A large quantity of very fetid, thin yellowish fluid was removed. The head wound looked continually better. No more secretion from the middle ear, nor from the fistula or the central part of the sinus, which was already partly filled with healthy granulations. Only the peripheral part secretes slightly, but the stench has disappeared. Death on the 21st day. The remaining part of the right transverse sinus contains a noninfected thrombus as far as the confluens sinuum, progressing a little in the longitudinal superior sinus and in the left transverse sinus. Cerebral edema, but no abscess, no inflammation. Right, putrid pleuritis, mediastinitis, pericarditis.

Spleen spotted; nutmeg-liver, but no liver abscess. All tissues icteric.

CASE 2.—On May 6 a 24-year-old bookbinder was brought to Burger's division. He had been taken two days previously to the hospital complaining that fourteen days before, he had come home sick, tired, feverish and drowsy. He remained in bed with continual fever. For eight weeks he had suffered with right-sided earache and dizziness. Eight days ago he had a dizzy spell, during which he seemed to turn quickly around. This morning he had a chill of half an hour, a week ago one which lasted half the night. The right ear runs for about four years, although it is deaf since childhood. Three days ago a swelling appeared behind the ear, painful to touch. He looked very sick; temperature, 40.4°. Right mastoid region reddish, painful, not swollen. A few centimeters backward a painful fluctuating swelling. In the meatus fetid pus and granulations, which prevented the drum from being visible. Papillitis in the right eye; left fundus and drum normal. No other changes. The hearing of the right ear is greatly decreased; hearing for bone conduction with tuning fork has increased in this ear. Diagnosis: Chronic otitis media with inflammation of the transverse sinus. The same evening, operation. Fetid pus escapes directly after removal of the external bone plate, and at the point of the processus the black discolored transverse sinus appeared very near the surface and forward, about ½ cm. only behind the bony auricular canal. The sinus was laid bare posteriorly, showing a normal color about 5 cm. backward. The central part towards the jugular bulb was entirely necrotic. The antrum was filled with granulations and pus. The v. jugul. int. was tied near the larynx; it was normal with fluid blood. The operation lasted two and three-quarters hours and needed 9 cc. chloroform. During the following day, twice rise of temperature to 39.1° and 41°, with remissions of 36.9° and 38°. Three days after the operation the right papillitis is unchanged and in the left eye incipient papillitis; papillæ not more sharply limited and veins enlarged. Patient feels excellent. Temperature, however, rises to 39.2°. Next day the neck and the lower part of the right cheek was swollen and painful. A large cavity with thin, yellow, fetid pus was opened. Seven days after the operation the disk became more normal; veins,

only, enlarged and tortuous. The following day, with renewed rise of temperature, expectoration of thick, yellow, nearly pure purulent sputum. Next day the horizontal part of the sinus posteriorly was opened; over 2 cm. long it was empty. The temperature, however, did not drop to normal; respiration was quickened (40 to 48 per minute). Subjectively feeling good. Ten days later 110 cc. slightly opaque serous fluid is withdrawn from the left pleural cavity, free from organisms. The diagnosis of left lung abscess was made. Three days after the puncture an edema of the entire thoracic wall, forward and backward, appears. The heart is pushed to the right. Puncture below the shoulder blade produces thin, yellow, fetid pus, about 1000 cc. This fluid contains a pure culture of cocci. A large lung abscess had perforated into the pleural cavity with formation of a pyopneumothorax. Patient needed stimulation. Next day again tapping, and on the following day thoracotomy. During the following days a gaseous subcutaneous phlegmon developed from the thorax wound and spread over the entire back. In three different parts of the lumbar region vertical incisions were necessary for the escape of yellow greenish, fetid pus, which was mixed with gas. These incisions led into a large abscess cavity, which contained necrotic tissues and undermined the skin of the entire back. A few days after the last operation fluid injected into the lumbar wounds flowed out of the wounds in the thorax. Although he looks very bad, he keeps feeling well, sleep and appetite good. He is very emaciated and weak. Constant high fever. The emaciation progressing; incontinentia alvi sets in. An edematous swelling of the sacrum heals under wet dressings. Later a para-articular abscess of the left shoulder developed; after incision, much thick pus. Two days later an empyema of the right pleural cavity was found, with much yellow reddish pus. Next day swelling of left elbow and forearm with much edema, which disappeared under wet dressing. At the same time an abscess in the perineum developed, which discharged much pus after incision. The general condition looks bad; he is wax-pale, emaciated ad maximum. The blood contains 50% hemoglobin; temperature up to 39.6°; pulse 160 to 180; respiration 44 to 52. From July 11th the temperature began to drop; since August temperature nearly constantly normal. At the same time the

nutrition improves, and in November Burger could present the patient to the Amsterdam Medical Society as recovered. As the radical operation had not been done, for obvious reasons, the ear needed much treatment, but after removal of a few sequestra the purulent secretion stopped.

CASE 3.—Girl, 22 years old, was brought in very sick and deaf. The left ear runs since some years. Nine days ago patient became suddenly sick with vomiting and pain in the left ear; fever; later headache, sleeplessness, chills; during the last few days complains of headache, pain in the neck, and diminished vision. On admission she was very sick; temperature around 40°. Head inclined towards the right; motion of the head, especially towards the left, painful. Now and then convergent squint. In both eyes papillitis. Kernig's symptom on both sides. Slight albuminuria. Pulse in accordance with the temperature, although now and then irregular and unequal. The right drum is perforated; some odorless mucous secretion. A scar behind the ear, but no swelling or pain on pressing. Much pain on pressure over the left mastoid process, directly behind the antrum (Griesinger's symptom). The upper posterior wall of the canal obstructs by its swelling the view of the drum; odorless mucus. Diagnosis: Inflammation of the left transverse sinus, consecutive to chronic inflammation of the left ear, with doubtful meningitis. The same day, operation. The proc. mastoid. was chiseled open at the typical place. Directly after removal of the external bony wall a cavity was found from which comes a cadaveric odor. This cavity is not a mastoid cell, but the posterior brain cavity, which extends very far forward into the temporal bone, touching directly the ear canal. At that place the transverse sinus was thrombosed. The very small mastoid was filled with granulations, which also filled the antrum. The radical operation was performed. No vestige of drum or ossicles. Removal of carious bone of the roof of the middle ear opened the middle brain cavity, from which pus came under high pressure. This extradural abscess was widely opened. The dura had a purulent membrane near the tegmen. The sinus then was laid bare until it looked normal; the discolored part was limited to the sigmoid sulcus. During this act pus appeared internal to the sigmoid sulcus, deep in the posterior brain cavity, between the temporal bone and

dura. This was drained with two fine tubes. The stinking contents of the diseased part of the sinus were removed, until hemorrhage appeared. Bandage. Duration, over two hours. The temperature after the operation remained pyemic. Some meningitic symptoms were present: Restlessness, psychic and motoric; screaming. Pulse relative to the temperature, slow (at 40.5°, 90; at 41.5°, 100). Intermittent squint with double vision; Kernig's symptom constant. She complains of constant headache and pain, especially in the neck and back. Consciousness remains intact. On the third day, three chills; on the fifth, pleuritis of the left side. The temperature fell on the morning of the sixth day from 40.2° to 36.8°; pulse 74. With lumbar puncture under 18 cm. pressure a couple of cc. clear fluid. The v. jugul. int. was ligated, found normal with fluid blood. Exitus the same evening without pain or spasms. The cerebrospinal fluid was that of meningitis; it contained many leucocytes, nearly all polynuclear. The wound smelled bad at the change of dressings on the fourth day. From the posterior cranial cavity internal to the sinus some pus still escaped. The dura of the middle cavity granulated, with the exception of a small necrotic spot. At the autopsy leptomeningitis of the entire cranial base was found, most pronounced at the base of the left cerebellar hemisphere. Here dura and cerebral substance were purulent infected. The pus, which had escaped during the operation from out the posterior cavity, proved to have come down from the purulent subarachnoidal cavity through a defect in the dura.

Case 4.—Five-year-old child; running ear for fourteen days; received with high temperature; very sick. Painful swelling behind the ear. In right meatus hemorrhagic, mucopurulent, fetid fluid; drum red. Left drum also dark red, not bulging. Diagnosis: Acute otitis media in both ears; inflammation of the right mastoid with imminent perforation outward. Incision liberated stinking pus. Next day, opening of the mastoid; no fistula or discoloration of the external bone. The bone is very sanguineous, infiltrated with pus; antrum filled with pus. Pus appears backward from out the posterior cranial cavity, under pressure, and pulsating. A perisinus abscess was opened and a collapsed sinus found, discolored for a short distance, which could only with dif-

ficulty be distinguished from the surrounding granulating dura. The left drum was incised. The child remained very sick. Next day edema of the right, later also of the left, upper lid; progressing inflammation of the cavernous sinus. No sign of meningitis except occasional vomiting. The edema diminished, but a left exophthalmus developed. The fifth day after the operation the child died quietly. Autopsy not allowed. No bacteriologic examination. The sanguinolent character and the excessive stench of the discharge are striking, since a known cause of the otitis was absent. The temperature curve was not typically pyemic, as is often the case in young children. The high and quick temperature variation, as well as the chills, are absent; the fever is more a continuous one. If Griesinger's symptom is also absent, the diagnosis of sinus inflammation cannot be made, especially as in children an acute otitis media and mastoiditis can be combined with high fever and signs of meningeal irritation.

Burger has been taught by experience that the middle and posterior cranial cavity must be opened in every case of intracranial inflammation consecutive to otitis. He also considers repeated changing of the dressings desirable, even to three and four times daily. Some days after operation the gauze in the central part of the sinus did not sufficiently suck up the stinking fluid. The hemorrhage from the sinus, which is sometimes renewed, is not sufficient contraindication. Ligation of the jugular vein does not with certainty prevent infection of the bloodstream. A number of cases recover without it, but Burger thinks he saved his second patient through it. It should be done when the sinus inflammation goes further centrally than the sigmoid sulcus, and if it is not done during the first operation it should be done as quickly as possible if the signs of pyemia remain. *Blaauw.*

II.—NOSE.

Atypical Operations on the Accessory Nasal Cavities.

PREYSING (*Zeitschrift für Laryngologie, Rhinologie und ihre Grenzgebiete,* Bd. III, p. 17) reports six cases of very extensive malignant growths, which had their origin principally in the region of the ethmoid. He makes a horizontal incision parallel with the eyebrows and a perpendicular in-

cision down along the bridge of the nose. The anterior walls of the frontal sinuses and the entire bony septum and one side of the nose is removed as far back as the sphenoid if necessary. Remarkable results were obtained, and, judging by the photographs and taking into consideration the severity of the disease, the cosmetic results are better than one would expect. *Horn.*

Treatment of Epistaxis.

Beverley Robinson (*New York Medical Journal,* July 31, 1909) advises for obstinate epistaxis plugging the nose with aseptic absorbent cotton twisted to the size of the little finger and introduced with a probe under a good light as far back as the posterior pharynx. In people past middle life it is usually dependent upon arteriosclerosis. A saturated solution of copper sulphate applied to the bleeding point on a cotton-covered probe is the best application for controlling it.

Harris.

A Case of Nasal Tuberculosis Terminating in Tuberculous Meningitis.

A. J. Huey (*New York Medical Journal,* August 7, 1909). The patient was a woman 39 years old, with no history of tuberculosis in the family. When first seen the left nasal chamber was completely filled with a friable vascular tissue resembling an adenosarcoma. There has been increasing difficulty in nasal breathing for the last four years, with severe headache at times. Microscopic examination reported the growth to be tuberculous, with marked edema. Three portions of the growth were removed, re-establishing nasal respiration. The septum and turbinates had been entirely destroyed. Treatment by means of the Röntgen ray was begun. Three weeks after the removal of the first portion of the growth the patient complained of severe headache and dizziness, ringing in the ears and deafness. High fever developed with delirium, followed by coma and death in four days. A diagnosis of tuberculous meningitis was made. No post-mortem was made. The possibility that the meningitis was pyogenic and not tuberculous is admitted. The author bases the diagnosis, first, on the slow onset, and second, on the fact that the meningitis was confined to the base of the brain and did not become general. He has been able to find but one parallel case in literature. *Harris.*

Sarcoma of the Nose, With Report of a Case.

J. PRICE-BROWN (*Journal of Laryngology,* October, 1909) makes a further contribution to the treatment of sarcoma of the nose by means of the galvanocautery. In addition to the three cases already reported, he reports four others treated by the same method. Out of the first six cases there was a recovery of 83%, or, regarding the last three cases too soon to report upon, a recovery of 75%. His grounds for the advocating of this method of treatment are:

1. In sarcoma of the nose the usual site of origin is in the soft tissues and not in the bony framework which supports them.
2. That the origin is in the form of a pedicle, which rapidly becomes sessile.
3. That as the sarcomatous mass enlarges and presses upon the surrounding mucosa, abrasions take place, which are quickly transformed into adhesions; and these adhesions in time will become almost coextensive with the disease itself.
4. That these adhesions never attain the vitality and virile power possessed by the pedicle. Hence, when once thoroughly destroyed, they do not form again.
5. Recrudescence, however, frequently takes place in the region of the pedicle; and in view of this contingency this region should be kept under regular observation and control.
6. When the nasal passage is filled with the sarcomatous growth any attempt to discover the site of adhesions will at once produce hemorrhage. Hence, intranasal removal by the knife should not be attempted; but as gradual and systematic dissection out by the cautery knife, except in extreme cases, is always available, it should not only be encouraged, but should be insisted upon. *Harris.*

The Anatomic and Clinical Relations of the Sphenopalatine (Meckel's) Ganglion to the Nose and Its Accessory Sinuses.

GREENFIELD SLUDER (*New York Medical Journal,* August 14, 1909) has made a careful study of the anatomic relations of Meckel's ganglion to the nose and accessory sinuses and points out in a convincing way the liability of its involvement in connection with disease of the accessory sinuses. Contrary to the usual impression, it lies in the pterygopalatine fossa, very close to the external bony wall of the nose, frequently only one

or two millimeters from the nasal mucous membrane. The sphenoidal sinus may form the entire upper boundary of this fossa, or the wall of the nose may curve so sharply outward as to form part of the anterior boundary. The sphenopalatine foramen is situated just posterior and immediately above the posterior tip of the middle turbinate. The ganglion usually lies close to the plane of this foramen, although not always. The author, from its anatomic relation to the pterygopalatine fossa, regards it as resembling an accessory sinus. In his experience characteristic disturbances have followed post-ethmoidal and sphenoidal suppurative inflammation, which cannot be explained otherwise than that Meckel's ganglion has become involved by extension. In 47 cases under his observation the typical picture is one of pain which begins at the root of the nose and extends downward to the maxilla and backward on the mastoid about 5 cm. posteriorly to its tip, thence extending backward to take in the entire occiput and downward into the neck. He gives the report of several cases where relief or cure have been obtained by the application of cocain over the sphenopolatine foramen or the injection of alcohol directly into the ganglion. *Harris.*

Acute Forms of Sinusitis.

A. RIVIERE (*Revue Hebdomadaire*, July 3, 1909). In the author's opinion, acute affections of the accessory sinuses have been overlooked, especially where acute exacerbation of chronic affection takes place. The symptoms are liable to be very severe for the time. He gives the history of two cases in his own practice. The first one was a man of 35, who had suffered from chronic sinusitis for some time, but refused operation. He was seized while motoring, with a violent pain in the head, chills and fever. The usual nasal discharge was suspended temporarily. The pain was so severe that the patient was delirious when he arrived at his destination. Anterior rhinoscopy showed pus along the left middle turbinate and edema and congestion of the nasal mucosa on both sides, especially on the left. There was also edema of the uvula and soft palate. The left frontal sinus was sensitive, but translucent. This condition lasted for 48 hours, and then, under proper treatment, gradually improved.

The liability of such a condition being confused in the mind

of the general practitioner with a more serious cerebral involvement is pointed out. Attention is then directed to the importance of sinus involvement in cases of grippe. In the involvement of the sinuses is to be explained the persistence of certain symptoms, prolonged convalescence, digestive troubles, headache, etc., all the result of a low order of infection of the sinuses. The onset of the involvement of the sinuses in these cases is characteristic. At first there is only a sense of dryness, with a feeling of obstruction in the nose, associated with violent headache. This may be variously situated in the occiput, frontal region or at the root of the nose. It is characterized by being increased on walking or sitting upright, and is better in the reclining position. At the second or third day there is a slight improvement coincident with the reappearance of the secretion. Two symptoms will be noted in addition to those of severe coryza; first, subjectively, a sensation of a piece of skin in the rhinopharynx, which the patient tries hard to get rid of, and second, objectively, the presence of considerable edema of the uvula and soft palate with ecchymotic spots, but without tonsil participation. Anterior rhinoscopy does not show any pus, but only edema and congestion, although mucopus is found by posterior rhinoscopy. The mucopus is the occasion at time of attacks of cough which are quite annoying. With the advent of the discharge, the intensity of the pain is diminished. Spontaneous healing takes place at the end of the fifth to sixth week.

For local treatment the author employs, apart from adrenalin and menthol, small tampons in the nose of glycerinated cotton and copious hot irrigations in the pharynx. *Harris.*

Intracranial Evolution of Nasopharyngeal Polyps. With Report of a Case.

GAUDIER (*Revue Hebdomadaire,* October 23, 1909). The patient was a child of 11 years, who for two years had nasal obstruction. He gave the characteristic adenoid facies. There had been nasal hemorrhage at times. An attempt had been made to remove the growth by means of forceps, but the severity of the bleeding prevented. When seen by Gaudier the tumor was pushing the soft palate down. It was hard and could be easily outlined with the finger. The mass bled easily, but less so than sarcomata in that position are wont to do.

Without a speculum one could recognize in the right nares a bleeding mass. The right maxillary sinus was dark by transillumination. The canine fossa on that side was pushed out under the skin, showing that the sinus was enlarged by the prolongation of the tumor. The growth was removed with Escat's forceps under chloroform. After the resection of the right superior maxilla the tumor was found attached to the base of the skull, but by skillful manipulation was enucleated from the sphenoidal sinus like a cork out of a bottle. An uneventful recovery took place.

For two years the child remained well. At the end of that time he returned because of excessive bleeding from the nose and mouth without any apparent cause. The child was very anemic, but showed no return of the growth. Further examination was deferred until the next day. During the night the patient was taken with a severe hemorrhage and died. The autopsy showed, after removal of the calvarium and brain, a large mass resting on the sella turcica, which had raised the dura mater. This tumor, however, on the left side had penetrated the thickness of the sphenoid on its lateral wall and appeared to have ulcerated the cavernous sinus. Further examination showed actual erosion in the body of the sphenoid by the growth which had proceeded from the right sphenoidal sinus and raised the dura mater without injuring the carotid or the external oculomotor nerve.

The author discusses at length the various phases in regard to the extension of nasopharyngeal fibromata into the cranial cavity. Although there are only 29 cases reported where such extensions have taken place, in his judgment they are vastly more common than that. It is generally held that the extension takes place through the cribriform plate of the ethmoid. Of the 29 cases in only 6 was a diagnosis made before autopsy. De Gandt, who has made a careful study of these cases, places much importance on the use of the ophthalmoscope in diagnosing. It must be borne in mind, however, that the penetration takes place in different localities, and sometimes the optic nerve would not be involved. The author agrees with Verneuil that it is absolutely impossible to diagnose these prolongations; one can only suspect them.

The author concludes that we are justified in suspecting intracranial prolongation without any symptoms, and that the only proper course to be pursued is a good opening of the

operative field with ablation of the growth and exploration of the point of implantation. Accordingly the resection of the superior maxilla, which gives such a field, especially if one employs the electric headlight (permitting of a thorough exploration), should always be practiced in cases of this kind.

Harris.

Regional Anesthesia in the Radical Cure of Maxillary Sinusitis.

MUNCH (*Revue Hebdomadaire,* November 20, 1909). The author gives a resume of the various methods employed for local anesthesia in operation upon the antrum of Highmore, and points out that all of them as far as producing complete anesthesia are faulty. He accordingly advocates and practices direct anesthesia of the superior maxillary nerve itself. This is to be done at the point where it emerges from the base of the skull in the posterior floor of the pterygomaxillary fossa. The solution is introduced at the point of election, the anterior border of the zygomatic arch indicated upon a figure which does not accompany the article. The nerve is encountered at the depth of 5 cm. He employs a 1% solution of cocain containing a small quantity of adrenalin chloride. Only a few drops of the solution should be used. From ten to twenty minutes are required to obtain anesthesia. At that time the lip, the gum, cheek, lower eyelid, middle portion of the temporal region, diploe and uvula are rendered insensitive. The anesthesia persists for an hour and a half, after which the nerve gradually regains its functions. While it is possible to strike the coronoid process of the inferior maxilla and pterygoid process of the sphenoid, no harm will result, and inclining the needle a little forward will correct the direction. It is also possible to enter the orbit by directing the needle too much in advance. The blood vessels are situated at such a depth that there is no danger of wounding them. In favor of this method of anesthesia the author urges the absence of pain, danger of swallowing blood and pus, and the entire freedom from shock.

Harris.

Functional Nasal Impermeability and Its Correction by Means of Re-education.

FOY, Paris (*Revue Hebdomadaire,* November 27, 1909). Nasal respiration is physiologic respiration. In many cases, however, buccal respiration with all its attendant dangers is

substituted, sometimes as the result of a mechanical obstruction, capable of being removed, situated in the nasopharyngeal tract; sometimes, however, without any such obstruction the respiratory funtion is entirely lost. In the first case we are dealing with mechanical impermeability, and in the second with functional impermeability. Functional impermeability is the inability to breathe through the nasopharyngeal passages air in sufficient quantities to sustain life. The cause of this is to be found in some obstruction, which existed at one time and which has disappeared, either as the result of operation or spontaneously by atrophy. These affections present variation in intensity and in form. Sometimes the difficulty in respiration is only at night; in the daytime no mouth breathing can be detected. In other cases mouth breathing persists day and night. Two types are to be distinguished: Insufficiency and impotency. Nasal insufficiency is the intermediary form between pure mechanical impermeability, the result of nasal obstruction, and functional impermeability, the result of nasal impotency. It is in reality a mixed impermeability. In the first instance it is functional, because the passage of air is not impossible, as in obstruction, there being not only an anatomic atrophy of the mucous membrane, but also functional derangement, the result of a faulty bulbar co-ordination of the respiratory movements and hypoesthesia of the nasopharyngeal mucosa, and in the second place, mechanical, because the respiratory mechanism is entirely insufficient. The nasal fossa, pharynx and thorax are in a condition of atresia, and, so to speak, atrophy in their muscles as well as in their bony framework. The explanation is easy. Insufficiency is always the result of pronounced obstruction of the nasopharynx or of the nasal fossa in infancy, or at an age when the skull is not fully developed, especially the facial bones. The obstruction will serve thus to arrest the development of the organ adapted to this function, that is to say, the nose and nasopharynx. The thorax will undergo the same atrophy, inasmuch as buccal respiration demands less effort on the part of the thorax than nasal respiration.

Occurring in childhood, the obstruction is usually in the nasopharynx. The face becomes deformed, is flattened laterally, shows the regular adenoid facies, the teeth more or less badly placed, the upper lip short, the nasal fossæ and naso-

pharynx narrow and the arch of the palate flattened and paretic. The nasal alæ are atrophic and paretic, small and approach the septum during inspiration. The thorax is atrophied and deformed. The nasal respiratory insufficiency is conspicuous. The nasal mucous membrane is often pale and atonic. The spirometer shows the respiratory capacity often far below the average. Fortunately all sufferers from adenoids do not suffer from nasal insufficiency, and a large number after operation regain in a few days nasal respiration. Those who are afflicted are generally former sufferers from adenoids who were not operated upon, and where in time spontaneous absorption of the adenoid has taken place.

The second form of functional nasal impermeability is nasal impotency. Here there is no anatomic derangement, no atresia, no atrophy of the respiratory organs, only a slight paresis of the alæ and of the roof the palate, no adenoid deformity, the nasal fossæ the proper size, often too large; the thorax is not deformed, and general condition good. The symptoms, however, are the same as those of pure obstruction or insufficiency, disturbed sleep, buccal respiration day and night, etc. The cause is to be found in a former nasal obstruction occurring not, however, as in nasal insufficiency, in infancy, but in adolescence or adult life at a time when the skull has become entirely developed. The obstruction is not an adenoid, but a hypertrophied rhinitis, polyps, etc.

In persons suffering from nasal impotency respiratory mechanism is functionally deranged in three different localities, in the nasal fossæ, in the bulb and in the psychic centers.

Physiologic respiration is an act at times voluntary, conscious, subconscious and reflex. Where a mechanical obstruction to breathing exists the subconscious act becomes conscious, and we voluntarily change the method and breathe through the mouth at first consciously, but later on, unconsciously, until physiologic nasal respiration is totally forgotten. When the nasal fossæ are free it is necessary, in order to resume the former physiologic breathing, to make an effort of the will. If the will is not strong enough or the bad habit too long acquired, the nasal impotency will continue. In addition, there exists the lost sensation in the nasopharyngeal mucous membrane which enables us to appreciate the subconscious mechanical friction of the air passing through the nose and without

which even if the nasal fossæ are free nasal respiration is impossible. Finally as a result of the perversion of the conscious, subconscious, peripheral and central respiratory function, the bulbar centers themselves suffer and give rise to incoordination of the respiratory reflex movements so that the sufferers come to have true ataxia of the nose.

Treatment.—The usual methods of respiratory re-education will fail except in the mildest cases. The exercises, moreover, are fatiguing, physically and mentally. While these exercises should not be abandoned, the author regards it important that they be adequately supplemented. For this purpose he has devised an apparatus which he has employed with increasing success. This consists of two tanks of compressed air, provided with air gauges and connected by means of rubber tubing with a glass reservoir provided with a U-shaped container. By means of this container the air is allowed to escape, under proper regulation, by a rubber tubing, into two olive-shaped tubes made of metal, for insertion into the nostrils. These have two holes, the upper for the respiration of the air and the lower for its exit. The method of use consists, after proper adjustment of the olive tubes, held in place by a head piece, of the inspiraiton of the air (pure or mixed with oxygen) into the lungs and its escape through the same channel, the mouth being closed. Inspiration is gentle, but deep. There is a short interval of repose, and then a repeated expiration with a longer repose. The exercises are continued for ten to fifteen minutes.

In this way Foy has secured the following results:

1. The dilatation of the nasal alæ.
2. The stimulation of the sensibility of the nasal mucosa.
3. When necessary, restoring the roof of the palate to its proper suppleness, elasticity and mobility.
4. The development of the expiratory and inspiratory muscles.

The reports of a number of cases are given where this method has been employed with benefit. *Harris.*

A Newly Discovered Cartilage Formation in the Nasal Septum of Man.

HABERFELD (*Monats. für Ohrenheilkunde und Laryngo-Rhinologie,* XLIII, Jahrg., 1909, 4 Heft, p. 241) says that in

50 per cent of cases of adults which he has examined there is on the mucous membrane of the posterior edge of the nasal septum a piece of hyaline cartilage, somewhat oval in shape, with its long axis parallel to the posterior edge of the vomer. In children and new-born infants this cartilage formation is very rarely found, and not at all in the fetus. Haberfeld believes in the rudimentary nature of this cartilage, because of its absolutely typical position, the frequency of its occurrence in adults, and that the cartilage never goes on to enchondral ossification. He is, however, unable to give to it any phylogenetic importance, as neither in man nor in animal is there any known organ occupying this position. He calls attention to the possibility of enchondral tumors developing out of this cartilaginous center. *Wood.*

A Divergent Olfactory System.

J. VAN DER HOEVEN LEONHARD observed that he was unable to smell eugenol under circumstances when normal persons perceived clearly the smell of cloves. At some other time he perceived, e. g., the smell of scatol in such a dilution when other observers did not get a positive impression. He then examined himself for the nine groups of odors and shows a graphic reproduction of the deviation, where the logarithms of the found values are used. With his abnormal osmasia abnormal trichromasia is combined. *Blaauw.*

Affinities of Smells.

PROF. ZWAARDEMAKER. Nine standard smells (amyl acetate, nitrobenzol, terpin oil, muscon, ethylbisulfide, guaiacol, valerian acid, pyridine and scatol) were made suitable for olfactometric use by solution in paraffin. In a suitable olfactometer the minimum perceptible and its probable fault are determined, and this value used as unit of olfactic excitation. The nine standard smells, combined two to two in 36 ways, give as many mixtures. Emulation, or indistinctness of smell, a few times even absence of smell, can be produced with these when the relation is well chosen. A large table shows these relative numbers. Deeper insight can be acquired in two ways: (1) By combining the idea of a vector with the smell irritation and deducing the direction of these vectors from the relative numbers. (2) By considering the relative numbers

typical arithmetically as tangent values and combining together the corresponding angular value. The first method gives him, who understands well the represented arrangement of the smell-vectors, a conviction of the present affinity based on evidence, while the second method gives an easy survey as a purely graphic remedy without the necessity of any supposition. Both methods lead to the same result. The possibility of a compensation between two standard smells demonstrates that both excitations can influence each other in such a way that both sensations, which otherwise arise, can weaken each other simultaneously, even to annihilation. The relative numbers are of value for a certain latitude, which Zwaardemaker calls the zone of cardinal proportions. The presence of this zone induces him to accept a multiplum of olfacties of one entity of compensating excitations. In the cases where the relative numbers are identical we have to suppose an identical way of influencing the consciousness. From a definite point of view, connected with the quality of smell, such excitations are therefore conformable, although they may be different in other points. When this identity, looked at from a definite standpoint, repeats itself different times under entirely different circumstances, it causes the acceptation of a deeper affinity of these qualities. So amyl acetate, nitrobenzol, terpin oil, guaiacol on one side and valerian acid and scatol on the other side seem more or less related. The physical significance of the established relationship is the demonstrated possibility for treating certain smell mixtures as well with the one as with the other fixant. In general, the doctrine of fixating substances, of great importance for the perfume industry, can be established on a methodical base by the developed system. Zwaardemaker then demonstrated a mixture-olfactometer. *Blaauw.*

Local Anesthesia in Nose Operations.

W. SCHILPEROORT. Of the three ways: (1) Diffusion from the mucous surface; (2) direct infiltration after Schleich; (3) indirect infiltration from one focus, the last one is the preferable one for the nose. Injection in an easily accessible place of a ½ to 1% solution of cocain with two drops of adrenalin to one cc. is the surest, safest and simp'est way. The needle must be moved in a forward and backward direc-

tion and in different directions to diffuse the fluid over a large area. Fractional sterilization gives a germ-free solution; or the necessary cocain can be dissolved in strong alcohol, and after evaporation the residue redissolved in sterilized salt solution (Mikulicz). The contractive action of adrenalin is not followed by vasodilatation. Still, it is preferable to tampon after the operation, because after the adrenalin action hemorrhage may appear, and one does not know in advance how serious this may be. The only by-effect observed by Schilperoort is palpitation of the heart directly after or during the injection, only of short duration. He used the method in 20 to 30 operations of fenestra-resections after Krieg or Killian. The needle was introduced as deep as the deflection of the septum allowed and drawn out during the injection. It was used also in some ten cases of removal of hypertrophies of the lower concha, with and without the bony implantation. After touching the anterior part with 10% cocain the needle was pushed deep in the concha toward the bone, pushed up along the bony border and drawn out slowly during injection; 1 cc. of a 1% solution of cocain was necessary. After 10 minutes as much can be removed as is necessary. It was used also in some 10 to 20 extractions of a molar or root, and openings of the antrum through the root canal; injection in the gum of 1 cc. of 1% cocain, half at the side of the tongue, the other half at the buccal side. It was also used in two cases of radical operation of the antrum after Luc.

Struycken warned against generalization in either direction. During operation it is often necessary to resort to general narcosis, e. g., when, after opening of the antrum, septa are found, or when the suppuration appears to originate in the posterior ethmoid cells. Some, who stood the operation very well, suffered for months afterwards with general nervous symptoms. He uses for local anesthesia alypin with adrenalin.

Wilkens did the Luc operation during the last year in Semarang (Dutch East Indies) on 14 cases of antrum disease, under local anesthesia, even outside of the hospital, and likes it very well.

Burger mentioned that in his clinic five such cases have been operated, and in his private practice twice in a 50-year-old lady. She stood the operation very well, but her nervous system needed a couple of months before it was normal again. He

advocates the method, with the restriction that some persons need general narcosis.

Moll thought that even with general narcosis cocain can be injected and thus the operation be bloodless. The reclining position is preferable on account of the danger of poisoning.

Schilperoort said that the "nervousness" is difficult to determine beforehand. The success when one operates is often beyond expectation. *Blaauw.*

III.—PHARYNX.

An Epidemic of Tonsillitis Combined With Sepsis.

LIEBL (*Med. Klinik,* No. 2, 1910) reports 35 cases of an endemic character, with all grades from the lightest symptoms to fatal cases of poliencephalitis. In one case the infection was so severe that symptoms of acute infection followed in six hours, in another death followed in 30 hours. No bacteriologic examination was made. *Horn.*

The Ideal Tonsillectomy.

J. M. PRATT (*New York Medical Journal,* April 2, 1910). Pratt regards the ideal method of removing the tonsils to be the freeing of the supratonsillar lobe by means of a knife with a curved, wavy blade. The tonsil is then loosened by the finger, dissected in its upper portion and then removed complete by means of the snare, which is left in position for five minutes in order to avoid bleeding. He condemns rapid method removal, because of the liability of hemorrhage.

Harris.

Indiscriminate Enucleation of the Tonsil.

PERCY FRIDENBERG (*New York Medical Journal,* January 10, 1910). The author raises his voice in remonstrance against the indiscriminate removal of the tonsil in toto. If it is to be done, he favors finger enucleation, but he questions whether in all or in most cases the entire removal is safe, necessary or useful. He argues that the prime consideration is removal of obstruction to respiration. So little is known of the physiology of the tonsil, especially of its capsule, that its removal except for cause must be earnestly deprecated. He is prepared to except cases of submerged, adherent or cryptic tonsils where recurrent inflammation supplies an operative indi-

cation, but otherwise in the great majority of cases he favors only partial removal, and concludes thus: "More care in the sifting of 'tonsils' and the deliberate choice of an appropriate operation rather than indiscriminate application of a single one because it is radical, are what must be insisted on in the interest both of patients and of our art." *Harris.*

Diffused Peripharyngeal Phlegmon or Senator's Disease. Report of a Case.

BAR (*Revue Hebdomadaire,* July 31, 1909). The patient was a robust man of 68 years of age, who, two days before Bar saw him, had been seized with a sore throat which, originally of slight severity, soon took on the appearance of a phlegmonous peritonsillitis. Incision into the swelling, however, did not evacuate any pus, but only dark blood. The following day the patient was better, but that evening the swelling had attacked the right side of the throat as well. Also on the outside the neck had become more swollen on that side. The temperature was somewhat elevated, but there were no chills. The day following, respiration became difficult and painful. That night the pharynx showed a bright red color, the soft palate was swollen and the uvula edematous. Incision into the palate gave rise to no pus. Capillary intestinal hemorrhage, epistaxis and dysuria followed. Examination of the exudate showed staphyloccocci and the diplococci of Fraenkel. Antitoxin was used without avail, and the patient died the following day.

The author makes the following resume: Peripharyngeal phlegmon constitutes an entity of exceptional gravity and great rarity, the diagnosis of which is difficult. At its onset it presents nothing beyond an ordinary sore throat. Then it resembles a peritonsillar inflammation, and in its final stage, associated with Loefler's bacilli and also streptococci, staphylococci, diplococci or pneumococci of Friedlander, which are the primary organisms, can be mistaken for a malignant diphtheria. This disease is in its nature a phlegmatic inflammation which spreads throughout all the superficial and deep tissues of the pharynx without presenting in any one region a true collection of pus. The result is almost invariably fatal. Its evolution is very rapid, death occurring in three or four days. The patient usually only suffers with a little fever, some-

times with a subnormal temperature, throughout the entire illness, and succumbs to cardiac failure or some complication due to septicemia. *Harris.*

Disorders in the Adult Arising from Embedded Tonsils.

TRETROP (*Revue Hebdomadaire,* August 28, 1909). A series of four cases is given illustrating unusual symptoms arising from embedded tonsils, the tonsillar origin of which is wont to be overlooked by the general practitioner. Bezancon has already pointed out that "a diminution of the vascular murmur at the apex of the lung, especially at the right apex, without modification of the percussion sound, can occur in persons suffering from insufficient nasal respiration, adenoids, enlarged tonsils, etc., and believes that if no other symptom of tuberculosis exists it is necessary to believe in the existence of functional insufficiency of the upper right lobe of the lung, due to interference with nasal respiration or to certain other causes which may escape us and which it is important to discover."

The author believes that "certain other causes" here referred to he has discovered in a bound-down tonsil, and as a result of his observation a diseased tonsil can produce cough, expectoration and diminution of the vascular murmur. Inflammatory process in the tonsil can arise without any pain and only a little irritation in the throat, which does not demand attention. There results, however, a proliferation of the connective tissues of the tonsils and adhesions of the tonsils and pillars which become hypertrophied. The surface of the tonsil, however, is usually smooth. Superficial examination does not show a tonsil at all. Indeed the tonsil can be reduced in size. Accordingly, respiratory insufficiency cannot explain the symptom. Tretrop has seen cases where the tonsils were so small that he hesitated to intervene. Cough and secretion in the throat were the prominent symptoms complained of in the cases reported, and were ascribed by the local practitioner to a pulmonary condition. *Harris.*

A Case of Rhinopharyngocele.

BROECKAERT (*Revue Hebdomadaire,* December 4, 1909). The patient was a child of eighteen months. At the age of two months a swelling developed on the left side of the neck, which had gradually become larger. The growth could easily

be compressed, and up to the time that it had been seen by Broeckaeart had been held in place by a band around the neck. The child appeared entirely well, good color, normal respiration. In the neck behind the angle of the jaw a round tumor could be seen, about the size of an orange. The skin covering it was normal in appearance and could be easily displaced. Palpation showed a soft growth easily depressed. Under the influence of strong expiration or during coughing, crying, etc., it obtained its maximum size. It was reduced decidedly during a deep inspiration. By strong pressure it was possible to cause it to entirely disappear, but as soon as the pressure was removed it immediately reappeared. Examination of the oropharynx and larynx revealed nothing, but the finger introduced into the vault penetrated behind the tubal eminence into a very deep fossa extending outward. This could be nothing else than the fossa of Rosenmüller abnormally developed. The child was presented at a meeting of the Belgian otolaryngologists. Operative intervention was decided upon, but on account of an accident to the child was abandoned.

The author discusses at some length this interesting case. The high pitched percussion note, the extreme rapidity with which it expands under forced expiration, its softness and flaccidity all establish the diagnosis of an ærocele. Of still greater interest is the point of origin, whether from the larynx, pharynx or trachea. The result of the digital examination excludes the larynx and trachea and permits the growth to be regarded as a rhinopharyngocele. The author has not succeeded in finding a second case in the literature. As regards the pathogenesis, after referring to the possibility of arrested development and congenital predisposition, the author decided in favor of bronchial remains, and regards it most probable that the second branchial cleft from which the fossa of Rosenmüller and the tonsil fossa are developed is the point of origin.

Harris.

Septic Hemorrhagic Pharyngitis.

HERMAN MARSCHIK (*Monats. für Ohrenh. und Laryngo-Rhinologie,* XLIII, Jahrg., 1 Heft, p. 68) reports an interesting case of septic phlegmon of the pharynx and larynx, accompanied by submucous hemorrhages, which proved fatal within fourteen hours after the appearance of the local symptoms and twenty-four hours after the first suggestion of any

illness. All forms of treatment were absolutely useless, though a tracheotomy was done nine hours before death to relieve the dyspnea. The infection was streptococcic in origin, and there were no signs of any abscesses or purulent infiltrations except a suppuration of the left antrum of Highmore. The hemorrhagic areas were found on the palate, pharynx, and especially around the opening to the larynx, and there were some even in the trachea. In connection with the extravasation of the blood there was a serous and cellular infiltration reaching from the epithelium down to the deeper layers, muscles, etc. *Wood.*

The Treatment of Acute Lacunar Tonsillitis.

LAMANN (*Monats. für Ohrenheilkunde und Laryngo-Rhinologie,* p. 881, XLIII, Jahrg., 12 Heft, 1909) says that the chief object in the treatment of acute tonsillitis is the sterilization of the crypts, and he proposes to do this in the following manner: After having determined with the probe the different positions of the lacunæ, he takes a probe, the end of which is made of silver, and instead of being round, possesses a large, coarse screw. This instrument is dipped in chromic acid, which has become liquid by exposure to the air, and then carefully introduced into each crypt. Care must be taken not to touch the uvula, and as soon as the instrument is withdrawn the patient should wash the mouth out with clean water. Cases of phlegmonous angina, which have a tendency to occur, should be treated after the cessation of an attack by thoroughly disinfecting the tonsillar crypts with chromic acid. He says this will prevent a recurrence. *Wood.*

"Phlegmon Ligneux" With Throat Complications.

H. BRAAT. *First Case.*—A ten-year-old girl had two months ago a little pain in the throat and a thickening at the mandibular border; later hoarseness; since a couple of weeks a slowly developing swelling in front of the larynx. No interference with swallowing. The child was pale and pretty thin with some erythematous patches on the face. In front of the larynx is visible a hard, painless, immovable, sharply defined swelling. Below the left mandibular angle is a second swelling the size of a bean. Mouth and pharynx normal. A light reddish, hard and painless swelling of the entire left half of the larynx was

present; the sinus pyriformis was obliterated. The left false vocal cord showed near the vocal process a yellowish-gray spot, seemingly ulceration. Temperature normal. The child was healthy and cheerful. Three punctures in the pyriform sinus were negative. After a few days the swelling in front of the larynx became softer; at the right side two yellowish patches appeared, which after incision discharged a little thick pus, which contained strepto- and staphylococci. Then the swelling shrank and disappeared after six weeks. At the same time the swelling in the larynx and the red patches in the face disappeared. Discharge of the nearly recovered child after two months, without a definite treatment being instituted.

Second Case.—Observed two years ago in a 60-year-old man. He had a broad, immovable, sharply defined, painless swelling, hard as a board, developing slowly, probably after an angina. The uvula was very much thickened, and the root of the tongue was rather hardened and thickened—also, the right side of the pharynx. Recovery after a few months (report of the family physician).

Third case was that of a 40-year-old man, who came a few weeks ago for a swelling of the neck and trouble while swallowing, beginning after an angina four months previous. At the right side of the neck a swelling had slowly developed, which increased in size and hardness, while the right half of the tongue had become larger. In the last few weeks, trouble while swallowing, and emaciation; no pain, no fever. A swelling, 10 cm. broad, hard, painless, alongside of the sterno-cleido-mastoideus. The muscle itself was not affected, as appears from the good motility of the head. Below the chin a similar tumor of the size of a hen's egg and a smaller one at the left side of the neck. The right half of the tongue was swollen to its double size, was hard, movable, painless. Swallowing very difficult. The right pharyngeal wall was swollen and hard, also the right half of the border of the epiglottis.

Braat considered these three cases to be "phlegmon ligneux," as first described by Reclus (*Revue de Chir.*, 1896), due to a chronic inflammation of the connective tissue, caused by non-virulent pyogenic microbes. The rule is slow resorption and recovery. He believes that abstaining from active treatment is preferable, as apparently self-recovery is the rule.

P. Th. L. Kan spoke about the treatment of some affections

of the lacrimal apparatus by permanent drainage with a silk thread. As this same subect is treated exhaustively, from the ophthalmologic side, by Prof. Koster in v. Graefe's Archiv referent refers to these two articles.

Waller Zeper treated two patients in this way and is very well satisfied so far. It was not difficult to get hold of the thread introduced through de Wecker's canule. One sees the thread, which is pushed forward by an assistant, curling in the lower nasal passage. He tied one single thread to a single copper wire thread.

Mulder treated some cases with an oculist. He did not find the hooking easy. Removal of the lower turbinate was usually necessary. Twice the thread appeared not below, but above the lower turbinate; probably much probing had been previously done. He advises that the thread be pulled upward out of the canule.

Struycken pointed out that in many cases no canule could be brought through the nasolacrimal canal.

Kan objected to pulling the knotted thread through. Sometimes the nasolacrimal canal ends naturally above the lower turbinate. A false route can become, after the drainage treatment, a good one. *Blaauw.*

IV.—LARYNX.

Treatment of Various Affections of the Larynx by Sismotherapy.

CONSTANTIN (*Archives Internationales de Laryngologie,* September-October, 1909). As the result of his experience, the author is of the opinion that sismotherapy can render the laryngologist, under certain circumstances, a very real service. The vibrations conveyed to the muscle fibers are wont to excite their contractility and produce a stimulation slight indeed, but of a pronounced efficacy. Acute aphonias, more or less complete, due to overuse or misuse of the voice, transient congestions of the chords without any apparent infectious cause, professional laryngeal neuroses, hysteric paralyses and possibly chronic nervous dysphonia of Brissaud are indications for its use. It is contraindicated in acute or chronic spasmodic affections of the larynx. The author has succeeded in a number of cases, suffering from one or the other of these conditions, in obtaining excellent results from mechanical massage. *Harris.*

Laryngeal Tuberculosis.

ROBERT LEVY (*New York Medical Journal,* September 11, 1909) out of his very large experience gives his views at some length on this all-important subject. In treatment the remedy is of less importance than the method of application. Indiscriminate use of formaldehyde preparations for all cases must be condemned. An excellent preparation is a one per cent solution of methylene blue. Tuberculin injections have shown beneficial results in a few instances, but the number is not sufficient at present to warrant any deductions. The author concludes as follows:

"1. Pathologic condition of the laryngeal mucosa, especially chronic laryngitis, are important factors in the etiology of tuberculosis of the larynx.

2. Pain is not always present in laryngeal tuberculosis. When present it is not always conclusive that the lesion is tuberculous. It may exist without ulceration.

3. The beneficial effect of mercurial treatment in laryngeal lesions of tuberculous patients should not be accepted as positive proof of the value of the treatment in tuberculosis. It must be recognized that the differential diagnosis between syphilis and tuberculosis of the larynx is at times extremely difficult, especially when the former exists in tuberculous patients.

4. Bacteriologic confirmation of the diagnosis is often obtainable by examination of smears made directly from the laryngeal lesion.

5. It is necessary to again impress upon the general profession the curability of laryngeal tuberculosis. It is especially important that the prognosis be determined by a careful study of the lesion in all its characteristics.

6. Local treatment to be effective must be well selected, both as to time of applications and methods of procedure."

Harris.

Actual Condition of Laryngostomy.

SARGNON AND BARLATIER (*Revue Hebdomadaire,* September 11, 1909). A further contribution to this subject by Sargnon and his confrere, Barlatier. Since their last paper they have modified somewhat their operative technic. At present in all cases where it is possible they suture the larynx to the skin before making a section or resection of the cica-

trices. In this manner a better view is obtained and retractors are not necessary. In order to diminish the length of treatment the cicatrices are, as thoroughly as possible, excised instead of being merely incised, as was practiced at first. They also remove the remains of the subcannicular spurs, which are often grave obstacles to respiration and can be the cause of relapse. For all cases of cicatricial stenosis they still employ the rubber method after the first eight days, when the gauze tampon is made use of. Comparison of the result by means of gauze packing, in their judgment, shows the superiority of the rubber dilatation. They do not regard laryngostomy as a very grave intervention. In a case of tuberculosis operated upon by Dr. Berard, a small goiter was removed at the time of the laryngostomy. No tracheotomy was made prior to the operation. The operative results were excellent. Three to four months are usually required in order to obtain dilatation of the larynx. A sufficient amount of time should be allowed to intervene after the dilatation before the fistula is closed. In grave cases occurring in aged persons and people suffering from fever, where dilatation is rendered difficult, they no longer employ suture de rapprochement, but first do an immediate autoplasty in order to obtain primary union and to diminish the length of after-treatment.

Indications for laryngostomy are the same, in their opinion, as formerly. It is indicated in endolaryngeal cicatricial stenosis and is the method of choice. Their failure in internal dilatation in such cases has made them decide in favor of external operation. If the lesion is not cicatricial, especially if it is a papilloma, rubber dilatation is contraindicated. Gauze tampon is sufficient here; the object of the laryngostomy is not to make dilatation, but to establish a permanent opening and permit of treatment. In cases of recurring papilloma with complications of cicatricial stenosis they advise rubber dilatation, at least for a time.

They suggest making use of laryngostomy in certain forms of tubercular stenosis. In spite of their failure in the cases referred to, they are in favor of the operation, provided that the lungs are not seriously involved. They would not only make an opening in the larynx, but remove the diseased tissue and then close with a flap.

The results of the laryngostomies are most satisfactory. Out

of more than 70 laryngostomies they know of only six deaths, and some of these occurred after healing, and were not to be ascribed to the laryngostomy. Of the 18 cases upon which they have personally operated, three have died. One case was due to bronchopneumonia, one died six hours after the operation from asphyxia (a large thymus was found), and one case died of asphyxia at the time of suture. The respiration is good in all the cases they have operated upon, with the exception of one. In all the canula has been removed, except in two patients operated upon recently.

They conclude that laryngostomy is an operation entirely classical and constitutes the treatment of choice for grave cicatricial stenosis and recurring papilloma. *Harris.*

Treatment of Cicatricial Stenosis of the Larynx by the Methods of O'Dwyer and Rogers.

D. Bryson Delavan (*Journal of Laryngology,* November, 1909). The paper of Delavan before the British Medical Association last year is one of the most important contributions to this subject. The pioneer work of O'Dwyer is referred to, and then the perfection of detail by Dr. John Rogers is carefully gone over.

Among the varieties of laryngeal obstruction to which the method is applicable are:

1. Cicatrices, traumatic, operative or inflammatory in origin.
2. Granulations around canula or intubation tube.
3. Hypertrophic subglottic laryngitis, most commonly encountered in retained tube cases.
4. Prolonged and repeated diphtheritic inflammation.

The principle upon which this treatment is based is that the interior of the larynx is a cavity or tube having rigid or inelastic walls and lined with various soft tissues liable to injury and therefore to the formation of cicatrices. Incision into the dense scar tissue will almost invariably reunite. Attempted removal of cicatrices in the larynx is not liable to be attended with success. Operations upon the larynx, whether within or without, tend in themselves to produce stricture. The cause of success in the treatment of these cases is in long-continued stretching of the scar tissue, which in time will lose its resiliency.

In order to produce satisfactory pressure on the cicatrix two things are absolutely necessary: (1) The instrument must

be adjusted with great accuracy to the shape as well as to the size of the stricture. The ordinary O'Dwyer tube will not answer this purpose. Each case must have its own tube. (2) The intubation instrument used must be large enough to exert the right pressure force on the contracted tissue. A properly constructed O'Dwyer intubation tube is almost a perfect instrument. It can be worn without harm to the patient for months or years.

Where autoextubation complicates the difficulties, a tracheal opening with a plug or clamp tube is necessary. Possible adductor spasm must be carefully considered, both for diagnosis and treatment. Under ether once in every three or four months the tube should be carefully removed and the respiration observed. If it is still completely or partially obstructed dilatation must be resumed, but if the breathing is natural and easy, spasm may be diagnosed. To overcome this, a tube with a neck as small as possible must be introduced.

A fibrous stricture is treated in the same way, with the exception of the primary dilatation in case the stricture is too tight to admit a tube. Under these conditions a tracheal fistula is usually present. Under general anesthesia urethral sounds are passed up and down until considerable resistance is encountered.

Reference is made to the statistics in 23 cases, many of them showing most satisfactory results after the persistence of the treatment. *Harris.*

A Chronophotographic Method for Studying the Resonants and Some of the Results Obtained.

H. ZWAARDEMAKER. Taking the upper end of his ærodromometer in one nostril while m, n. or ng are pronounced, the instrument makes an incision, which can be registered chronophotographically. As demonstrated, projected curves show the extent of the excursion, and thus the velocity of the escape of air through the nose—larger for whispering than for normal speech. Comparison with the graphic of the changes in pressure in the nasopharyngeal cavity and of the curves of the motions of the palate directly taken by Prof. L. P. H. Eykman showed that a large part of the preceding and following consonant is spoken nasally. Rousselot and Eykman had reached this conclusion previously. The new method teaches

how to measure the escaping air. During the pronunciation of the word "Ammann" 7 to 12 cc. escapes through the right nose. Zwaardemaker had not had time for examination of pathologic cases, but assumes differences. The method will be of value in case of disturbing nasal sound without apparent disturbance of the palatal closure. *Blaauw.*

The Cutting in Two of a Large Steel Pin, While Transfixed in the Left Bronchus and Its Removal by Lower Bronchoscopy. A Bronchoscopic Pin-cutter and Fragment-holder.

W. E. CASSELBERRY. A glass-headed, 1½-inch, very sharp, steel pin was found by upper bronchoscopy to be immovably transfixed in the first bronchial branch, and across the left bronchus of a 15-year-old girl, and the manner in which this accident happened should be made generally known in order that so dangerous a method of dressing may be avoided.

The young woman, with pin in mouth and skirt in hand, in readiness to drop the skirt over her head, raised very high her outstretched arms—an act which is identical with the first movement in Sylvester's method of artificial respiration, which owes its power to the fact that raising the arms expands the lungs and causes an inrush of air, the mouth opening, itself, as if by instinct; and, at the same moment, to let the skirt fall clear of her hair, the head was thrown backward and face upward, bringing the mouth, larynx and windpipe into a straight vertical line, an attitude identical with the sword-swallower's position. The pin, let loose, simply dropped with the air current, head foremost, into the left main bronchus, and on downward till its head and two-thirds of its stem had passed into the first bronchial branch, where, being too long to quite make the turn, it was arrested, with its head compressed against an upturning segment of the bronchial branch, and its point against the opposite wall of the main bronchus. Both ends of the pin being against a barrier, the impact of cough had sufficed to drive its point firmly into the bronchial wall, and in this transfixed position it had remained, without causing serious discomfort, for ten weeks. Freedom from suffering for so long a period leads a patient to forget or to doubt the presence of a foreign body, and as the physical signs are indefinite when the object is but slightly obstructive, the X-ray,

supplemented by bronchoscopic inspection, may be the only means of positive demonstration. That the X-ray, however, has its shortcomings and really needs to be supplemented by direct observation through the bonchoscopic tube was made evident by a serious delusion in the interpertation of the first skiagraph of this case, an extraneous or false shadow "very like a pin," which appeared on the right side, having been at first accepted, as the sought-for outline, whereas the pin was lodged on the other side, its real shadow obscured in the shade of the sixth rib. Furthermore, nothing short of upper bronchoscopy could have disclosed the exact position and state of transfixion of this pointed object, a disclosure essential to devising a plan for its removal. At the first operation every effort was made through the bronchoscopic tube to displace the pin without cutting it. It was grasped at the depth of 11 inches, with various bronchoscopic forceps, the grasp being many times renewed to change forceps or vantage point of the grip, but without avail, except for the conviction that it must first be cut in two.

Based on the favorable result of the following procedure, it is proposed, as a general principle, in order to facilitate the bronchoscopic extraction of immovably transfixed pointed objects, such as pins, needles and perhaps open safety pins, first, to divide them, through the bronchoscopic tube, into two or more parts; and the instrument or pin-cutter devised for this purpose is described.

A valid criticism would seem to be the disposition of the parts of a pin, when cut, to fly asunder hence, possibly to drop out of sight or out of reach of the bronchoscopic forceps. But this contingency did not occur, for the beak-shaped, slotted, scissor-like cutting mechanism is so devised that one of the two fragments will adhere with dependable regularity and firmness in the serrated slit alongside the blade bevel, as long as the blades are not permitted to reopen, and moreover, the operator can elect the fragment to be so held by turning the blade. Therefore it was planned to minimize the risk of losing the smaller fragment by electing it to be held in the grasp of the pin-cutter.

It was deemed expedient, by reason of the novelty of the procedure, to operate this time by lower bronchoscopy, although it is now realized that the pin-cutter and the principle

of its use are applicable as well at the longer range of upper bronchoscopy. A few additional efforts to extract the pin without cutting having proven futile, the pin-cutter was passed down the bronchoscopic tube. It operated exactly as planned, one could hear the snap, see the larger fragment shiver and then discern the small, pointed piece in the beak of the instrument, held fast in which it was withdrawn, and in another minute, the larger piece, in the grip of a bronchoscopic forceps, came safely out. *Author's Abstract.*

V.—MISCELLANEOUS.

Nasopharyngeal and Laryngeal Symptoms in Syringomyelia.

BAUMGART (*Berliner klin. Wochenschr.*, No. 34, 1909) reports a case in which the first suspicion of the disease was awakened by the laryngoscopic examination. The findings were as follows: Left posticus paralysis, slight right posticus paralysis with perverse movements of the vocal cords and descant of the speech. Right-sided atrophy of the tongue. Movement of the right side of the soft palate less than the left. Knee reflex normal. This excluded tabes, and as there was only a one-sided atrophy of the tongue and no atrophy of the lips, bulbar paralysis was excluded and the diagnosis pointed to syringomyelia. *Horn.*

Dental Cysts.

GERBER (*Archives Internationales de Laryngologie*, November-December, 1909). Dental cysts are not so rare as is usually supposed. Gerber has seen fifty in his own practice. The presence of serous fluid and the dilatation of the walls of the sinus are the most characteristic symptoms. He has rarely seen a dilatation of the nasal wall of the sinus. In advanced cases the diagnosis is easy, but in beginning cases often difficult. The pathognomonic sign in beginning cases is an elevation of the floor of the nasal fossa on the affected side in the anterior portion and the turning of the head of the inferior turbinate upward. At times between the inferior turbinate and the floor of the nasal fossa a tumor, more or less pronounced, can be seen, which, when touched with the sound, gives, but not always, a certain degree of resistance and fluctuation. A characteristic blue color is wont to follow the im-

pression of the sound. Finally Röntgen photograph is an additional aid in diagnosis. The histories are given of two cases operated upon according to the method of Partsch, modified by Gerber. This consists in the dissection of a flap, the base of which is attached to the alveolar process, and of which the free end is cut deeply from the mucosa of the cheek. The flap, having been dissected and elevated, the cyst is extirpated in its entirety, as far as possible, after which the mucous flap is placed in the bony cavity and held there by a tampon.

Harris.

Foreign Body in the Esophagus and the Relative Value of Esophagoscopy and External Esophagotomy.

MOURE (*Revue Hebdomadaire,* September 4, 1909). The value of the direct method for examination and removal of foreign bodies from the esophagus is well established. There are, however, cases where failure will be met with. Examples of these are cases where little children have swallowed coins. Occasionally Moure has been able to remove such coins by the direct method with the Killian seizing forcep. In other cases, on the contrary, by far the most numerous, the instrument will pass below the coin and enter the esophagus without allowing the foreign body to be seen or grasped. The children are often brought to us after operative manipulations in the throat have rendered the mucous membrane in the throat broken down by ulceration. The Kirmisson hook in such cases is a harmless instrument and decidedly to be recommended.

The case which the author reports is that of a young child 3½ years of age who, in the course of his play, had swallowed a toy anchor of iron. For some time no trouble in swallowing or respiration was noted. At the end of five days difficulty in swallowing started in, associated with copious salivation and coughing. Radioscopy showed the presence of a foreign body behind the cricoid. Under chloroform Moure attempted direct esophagoscopy, but the forcep passed directly into the bronchi without entering the esophagus. A second radiograph showed the presence of the anchor, 3 cm. long, with a transverse arm, placed perpendicular to the lower portion of the anchor. This was about on a level with the inferior sternoclavicular junction, the inferior extremity directed toward the

left at an angle of 45 degrees, turned toward the posterior wall of the esophagus.

Moure made a second attempt by the direct method, and while he was able to seize the foreign body, did not dare use sufficient force to take it out. He accordingly proceeded to perform the external operation; no difficulty was experienced in removing the anchor by this method. There was considerable breaking down of the esophageal mucous membrane, and some suturing was required. An esophageal sound was introduced through the left nares for the purpose of feeding. A small drain was introduced into the lower portion of the wound. Satisfactory recovery.

The author concludes, the case is an interesting one, on the one hand because it demonstrates the inefficacy of esophagoscopy in certain cases, rare it is true, and on the other hand, the benefit of external esophagostomy in spite of the young age of the patient. *Harris.*

The Treatment of Cervical Tuberculous Lymphadenitis and Tuberculous Dermatosis by Means of the X Ray.

Russell H. Boggs (*New York Medical Journal,* February 19, 1910). The results in the treatment of cervical tuberculous adenitis by means of the X-ray are so satisfactory that this method is deserving of a great deal more attention and serious consideration than has been given. The cosmetic results are better and the end results more permanent. The Röntgen ray appears to have a constitutional as well as a local effect. Crane's theory explains this satisfactorily. This may be stated as follows: "The immunizing substance set free under the influence of the X-ray is of necessity 'autogenous,' that is, it is formed from the actual microbic strain which is producing the disease." When a chain of lymphatics is rayed intensively they undergo a fibrous degeneration and almost entire obliteration without serious effect to surrounding tissue if the radiation is properly administered. If the glands are diseased, the reaction of the epithelial cells is much quicker and more marked. Tuberculous adenitis may be divided into three classes. First, where the glands are only slightly enlarged, it is a question whether they are tuberculous or not. Such cases frequently are seen after typhoid fever, measles, etc. The child is greatly emaciated. This class of adenitis

should certainly be treated by the X-ray, because every one of these patients can be cured. After the first twelve or fifteen treatments the local disease not only begins to improve, but the patient gains in health and weight. Suppurating glands should first be incised. This does not interfere with the radiation, and treatment should be begun the next day. Suppurating glands should be treated by the X-ray.

Second, cases in which the glands are of large size and have resisted ordinary treatment. These glands should be rayed intensely. At the end of three or four months they have usually undergone degeneration, are freely movable and are about one-fourth the size when treatment was begun. The Röntgen treatment is advised in these cases, because the apices on the affected side are nearly always involved, and if rayed intensely general tuberculosis will be prevented.

Third, in the treatment of over twenty-five cases of recurrence following operation, it was the experience that it is neeessary to begin X-ray treatment more gradually. The first improvement is the gain in weight and general health. The Röntgen ray and Finsen light are established methods of treatment in lupus. One advantage of the Röntgen ray is that it takes less time to cure a lesion.

Instruction in Speaking for Stutterers.

A commission, consisting of the Drs. Moll, Mulder and Schutter, with the director of the deaf-mutes' institute at Groningen, Mr. Roorda, made a report, which was sent to the members, which treats the question of how to provide for instruction to stutterers. The commission prefers government schools with resident pupils and regular teachers, who limit themselves to instruction in speaking. This system has the following advantages: (1) The pupils are removed from the often hurtful influence of the home surroundings; (2) The time for instruction is longer, the superintendence more efficient; (3) Co-operation of teacher and specialists; (4) Treatment of the stutterers from the country. As example is the "Statensinstitut for Talelidende" at Kopenhagen.

Burger warned against a too theoretic treatment of the question. Municipal courses in Germany have given pretty good results. The financial part must be considered.

Kan reported concerning Leiden, where a voluntary teacher

treats them. In the schools more notice is taken of speech defects than formerly. The result is that they are found less in the higher grades than in the lower. Municipal courses are less expensive and do a great amount of good. The government commission wishes to teach in the training schools the physiology of speaking and to institute ambulant courses for the country.

Van Anrooy mentioned that in Rotterdam such teachings are given in the training school. Teachers of the deaf-mutes institute are willing to give instruction free of charge.

Mulder, secretary of the commission, did not consider it to be the duty of the commission to draft a budget. The school in Denmark costs f. 15,000 ($6,000). Faults in the pronunciation can be treated in the school. This improves with the development of the children.

Burger did not approve of the commission urging the establishment of a government school. The instruction for particular cases (blindness, deaf-mutism, idiotism) is given in Holland through private institutions. The right way would be to form a society for the starting of such a school, and if wished for, to ask for financial support from the government.

Ten Cate thought that the number of stutterers in the country is less than in the cities.

Mulder said that the commission did not inquire into it, but that the literature does not prove it.

Zwaardemaker thought that the knowledge of phonetics and musical talent would make a good practical pedagogue particularly apt for this kind of work.

Burger proposed that a pamphlet be sent out by the society to direct the public attention to particular teaching of stutterers. Mulder will do this on his own responsibility.

Blaauw.